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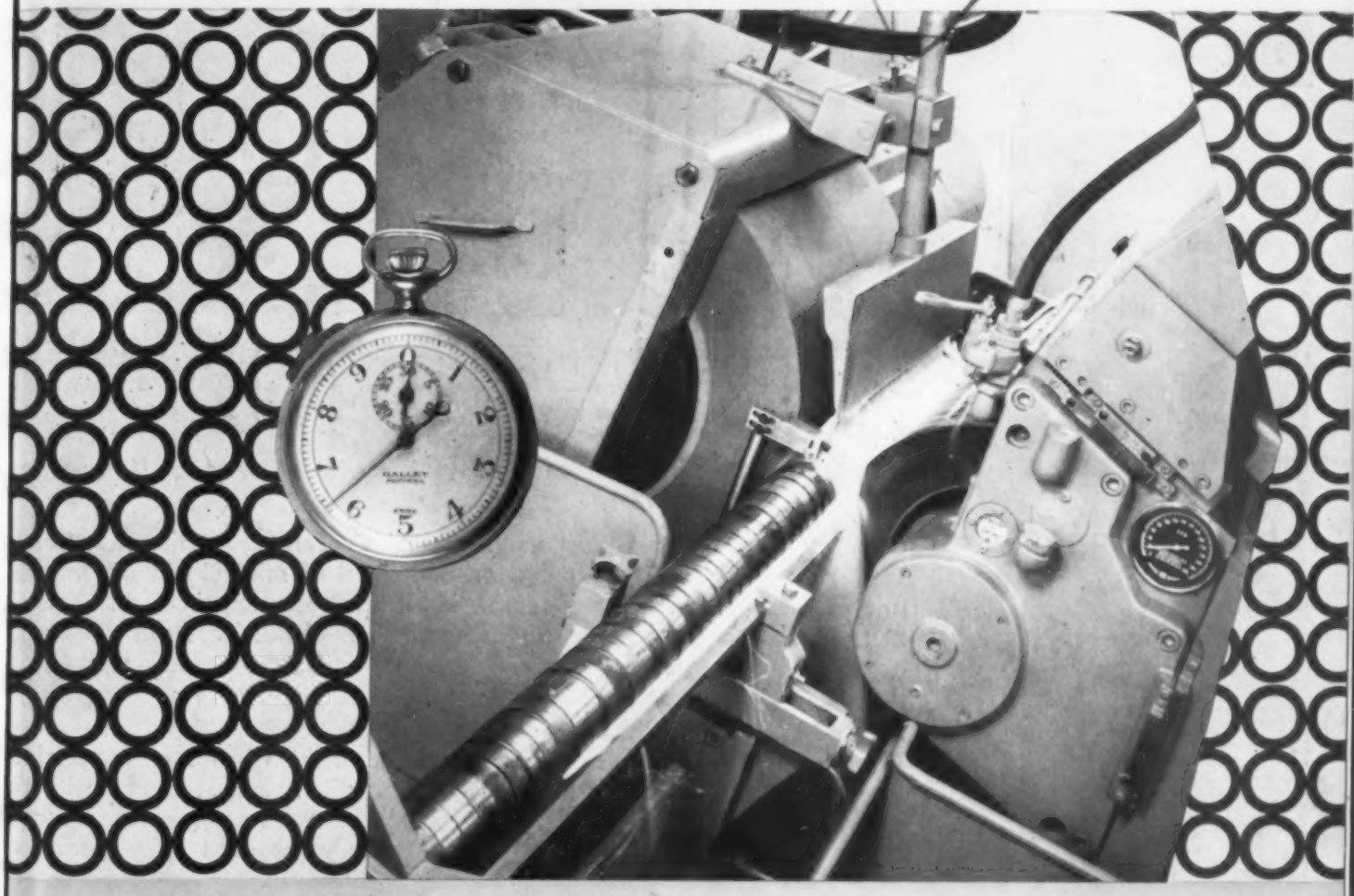
OCTOBER . 1961 . 50 CENTS

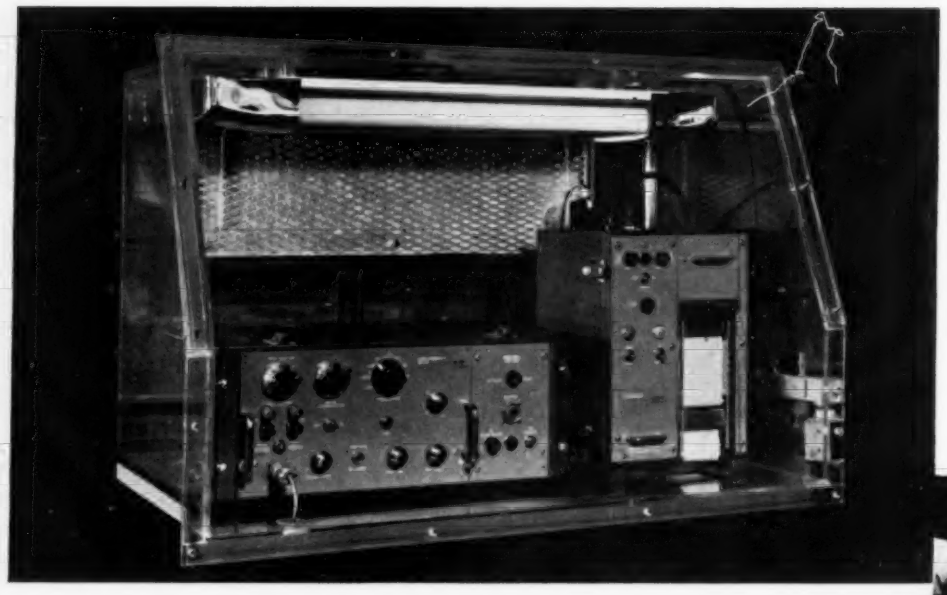


Centerless: high-production OD grinding

WHAT IS INVOLVED IN WHEEL SELECTION?

AN INTEGRATED APPROACH TO GRINDING COSTS

METALWORKING ACHIEVEMENT AT ASM SHOW



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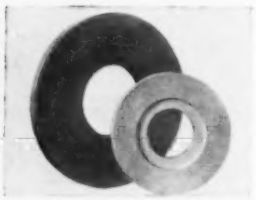

On May 10, at the Production Engineers' Conference at the A.S.M.E. a Toronto, a paper was presented on a method of scientifically determining grinding wheel hardness and uniformity. It involves using the Dynamometer illustrated above, to *accurately determine wheel hardness and uniformity across the entire cutting face of the wheel under controlled rotating conditions which simulate actual grinding.*

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Minute amounts of abrasive are crushed from the wheel's cutting surface by a conical, hardened steel wheel which is in running contact with the grinding wheel being tested. The force required to crush these minute amounts of abrasive and bond is electronically recorded on a permanent tape. Any significant variation in wheel uniformity or hardness is recorded on the tape. *This means* Dyna-Graded® wheel characteristics are precisely predetermined *before* the wheel is shipped. This means we can assure you more accurate wheel duplication, order after order. This means better cost control of your grinding operations.

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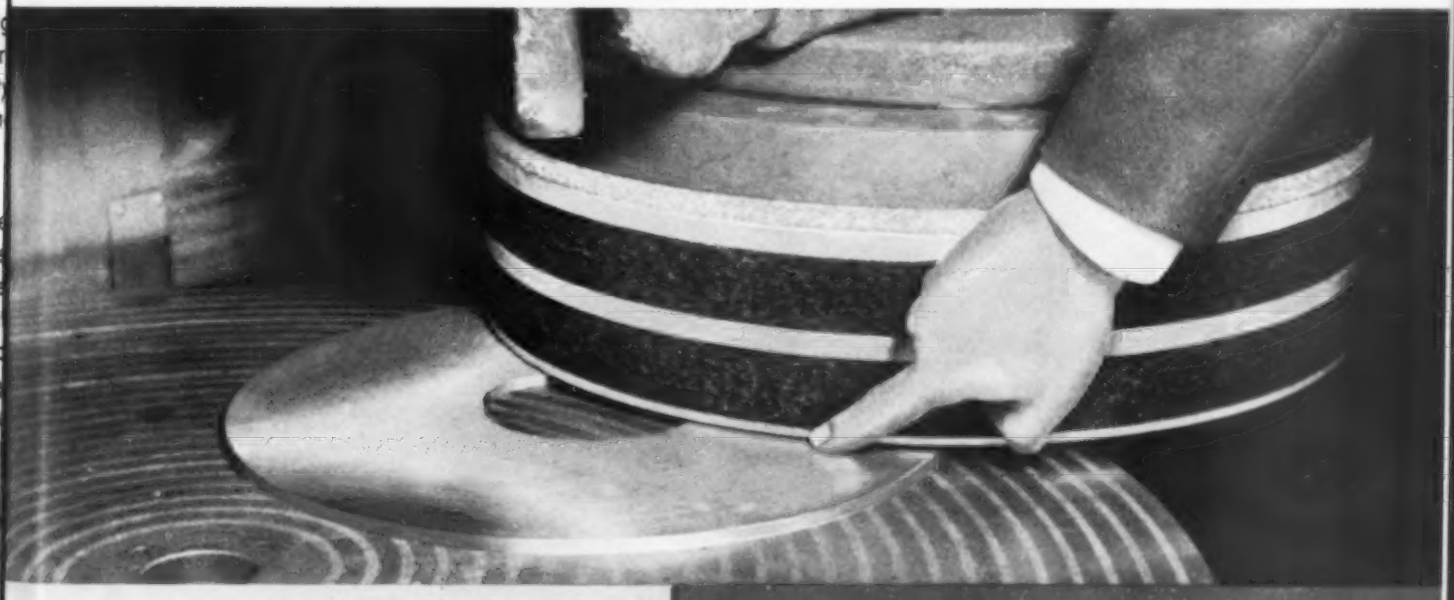

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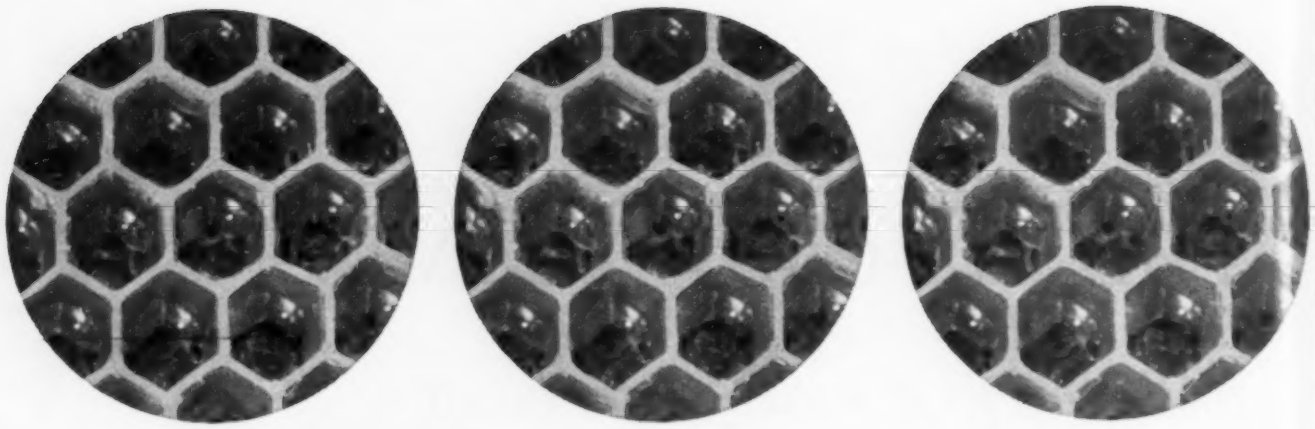

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- Abrasive Operations on the '62's

Grinding and Finishing

For Better Production and Finishing with Abrasives

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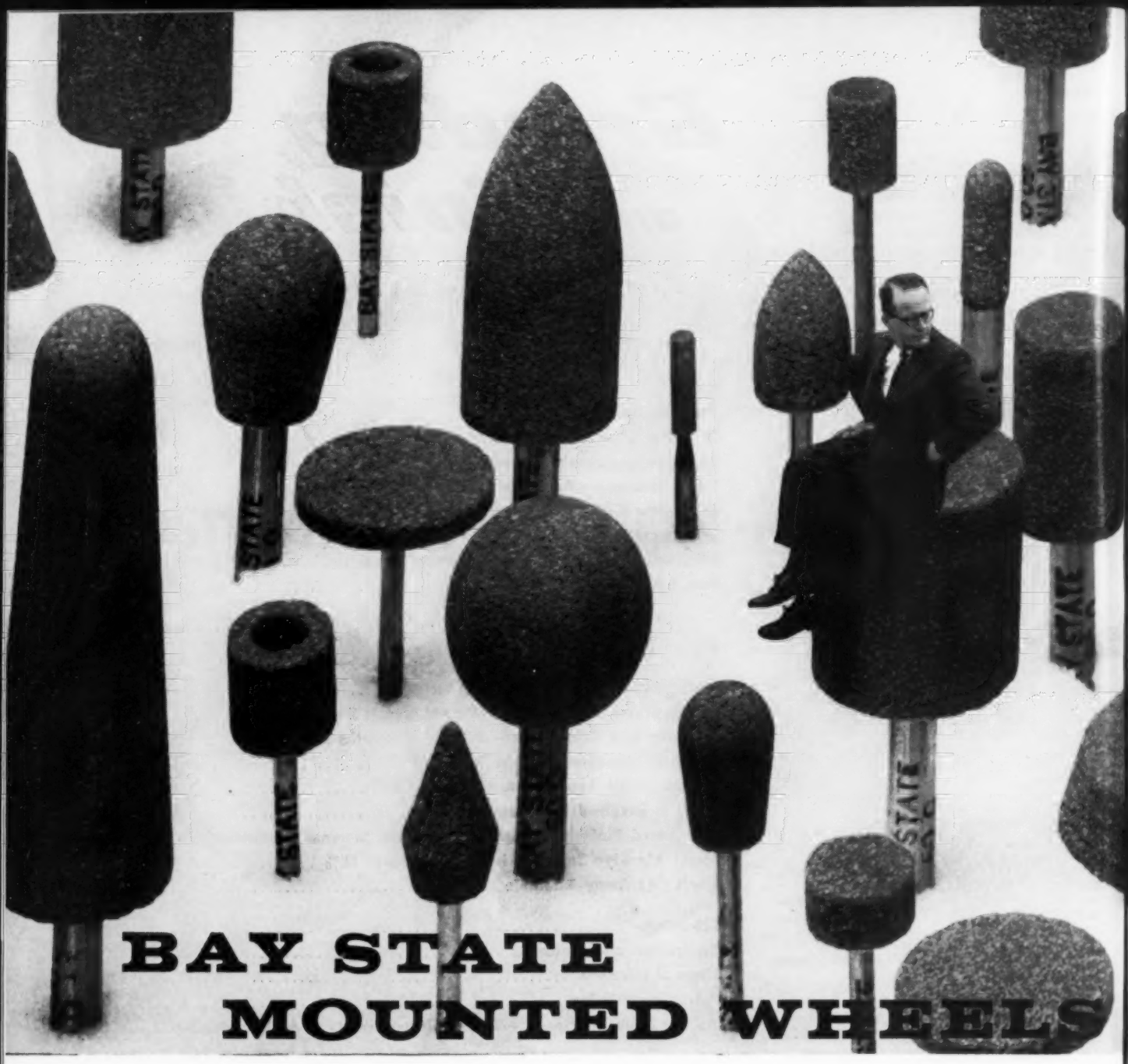

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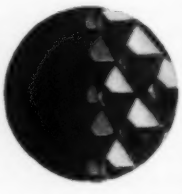

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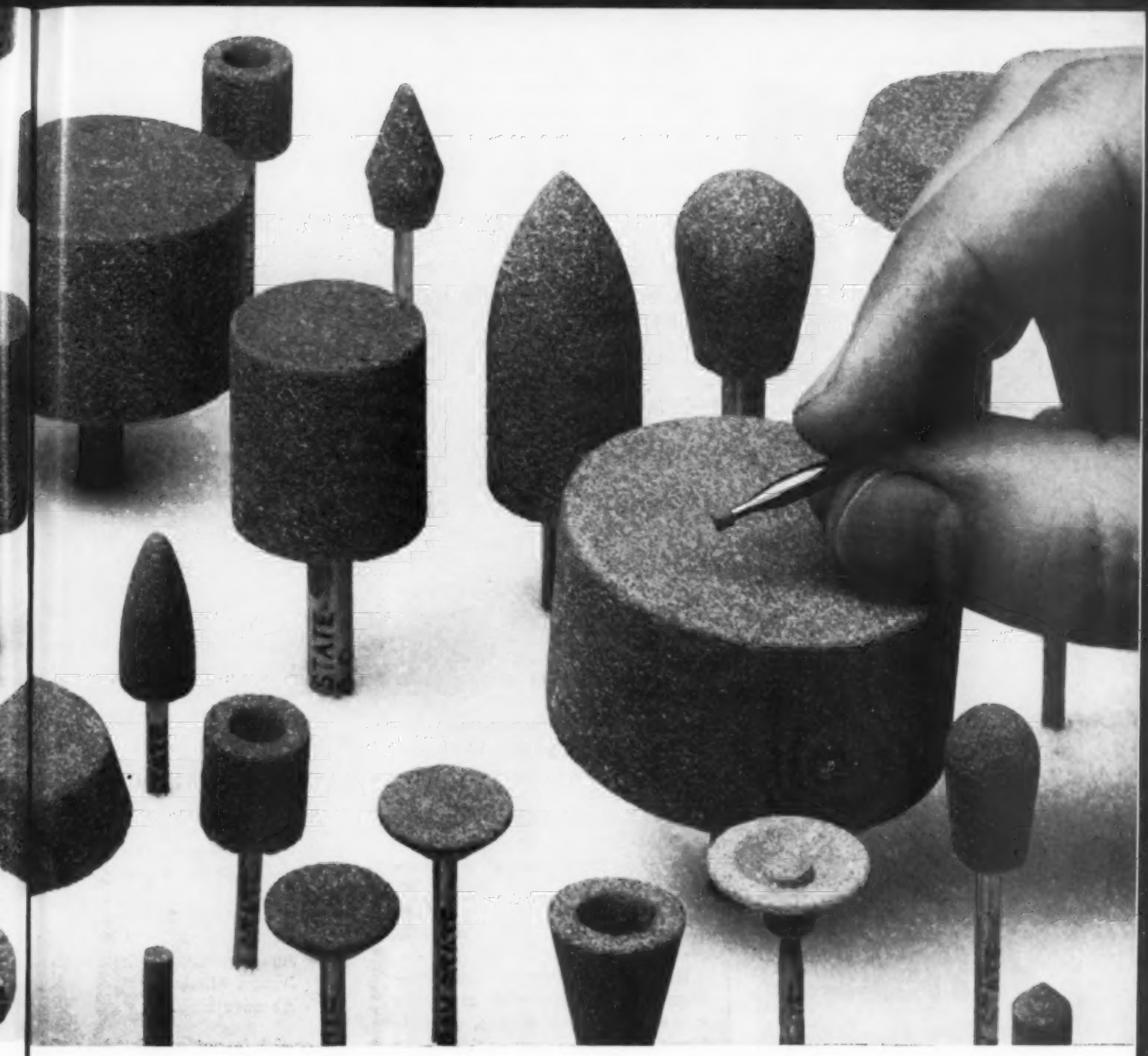

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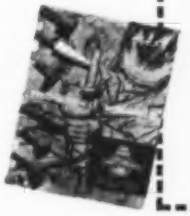

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GRIND TEST SPECIMENS . . .

On page 20 of the July issue, the article "Grind better test specimens faster" indicates that the wheel being used is a 20″ diameter vitrified bonded wheel with a wheel speed of 7200 rpm. This figures out to be 36,865 sfpm. Will you kindly advise if this is actually correct.

Macklin Sales Company
M. T. Hunt
Director of Sales

As Mr. Hunt and several other sharp-eyed readers have intimated, 36,000 plus sfpm exceeds any established safe maximum "more than somewhat," to quote a Ring Lardnerism.

This was a typographical error. The correct figure is 7200 sfpm, still somewhat above the traditional 6500 sfpm, but justified by the machine design and guarding as a special maximum.

This is one of the most serious gremlins in writing about abrasives.

Our most noted error—though fortunately not as serious—occurred on the cartoon below, which originally appeared in January, 1959.

Had the policeman—and we—translated sfpm into mph as rapidly as a number of our readers, our little friend would have been in the jug for a long, long stretch. That is, of course, if the policeman could have caught him.

According to the last re-check, verified on the abacus, 9,504,000 sfpm equals some 1800 mph.

"Honest, Officer, I was only going the legal speed, 9,504,000 sfpm!"

INSTITUTE AWARD PROGRAM . . .

I want to thank you for your part in my receiving a Grinding Wheel Institute award (for the article, "Quill Solves Internal Grind Problem," July, 1961).

The check for $50.00 was very welcome, but the plaque was really something. My grandchildren will have something for an heirloom in the years to come.

John Walsh
Process Engineer
Whitin Machine Works

Readers who submit ideas like this one make an editor's job easier.

A similar check and a plaque are available for anyone who submits an acceptable writeup on how he did a job more economically, better or faster by grinding.

If you have such an idea, send it in, preferably with photos or an India ink sketch. If the idea is sound, we can take care of the wording.

TYPE 11 vs TYPE 27?

What about Type 28???

American Emery Wheel Works
Jerome Mitchell
Abrasive Engineer

Type 28 is not yet listed in the American Standard Specifications for Standard Shapes and Sizes of Grinding Wheels. According to the best available information, it is a dished-depressed center wheel similar in composition to Type 27.

It appears likely that many of the comments about Type 27 would also apply to Type 28. However, the article in question only compared two unlike wheels which overlap to some degree in application. It appeared to be a situation which needed clarification. That is why the article was printed.

There may also be something to be said for the Type 6 straight cup wheel in similar applications.

We'd be glad to have any further comments concerning this or other grinding problems, and will print them as space permits.

IF YOUR ABRASIVE BELTS LOOK LIKE THESE ... your production costs are too High!

If your used abrasive belts are wearing out prematurely due to one of these conditions, you are incurring extra expense in manhours, abrasive replacement and perhaps, even production volume. The Carborundum Company has made a detailed study of causes and solutions to loading, glazing and stripping of abrasive belts. Practical application of these findings to your grinding or finishing problem can result in increases in abrasive belt life from 10 percent to 500 percent. Typical problem solutions often involve only a change in the abrasive product, a different contact wheel or a changed coolant. Call your Carborundum distributor or factory representative today for an on-the-job analysis. Coated Abrasives Division, Niagara Falls, New York. **CARBORUNDUM**

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LOADING: Metal particles packed in between or completely covering the abrasive grains of the belt coating.

GLAZING: Face of belt smooth and glossy—indicates dulling of abrasive grain tips.

STRIPPING: Particles of the grain and bond pulled away exposing bare backing.

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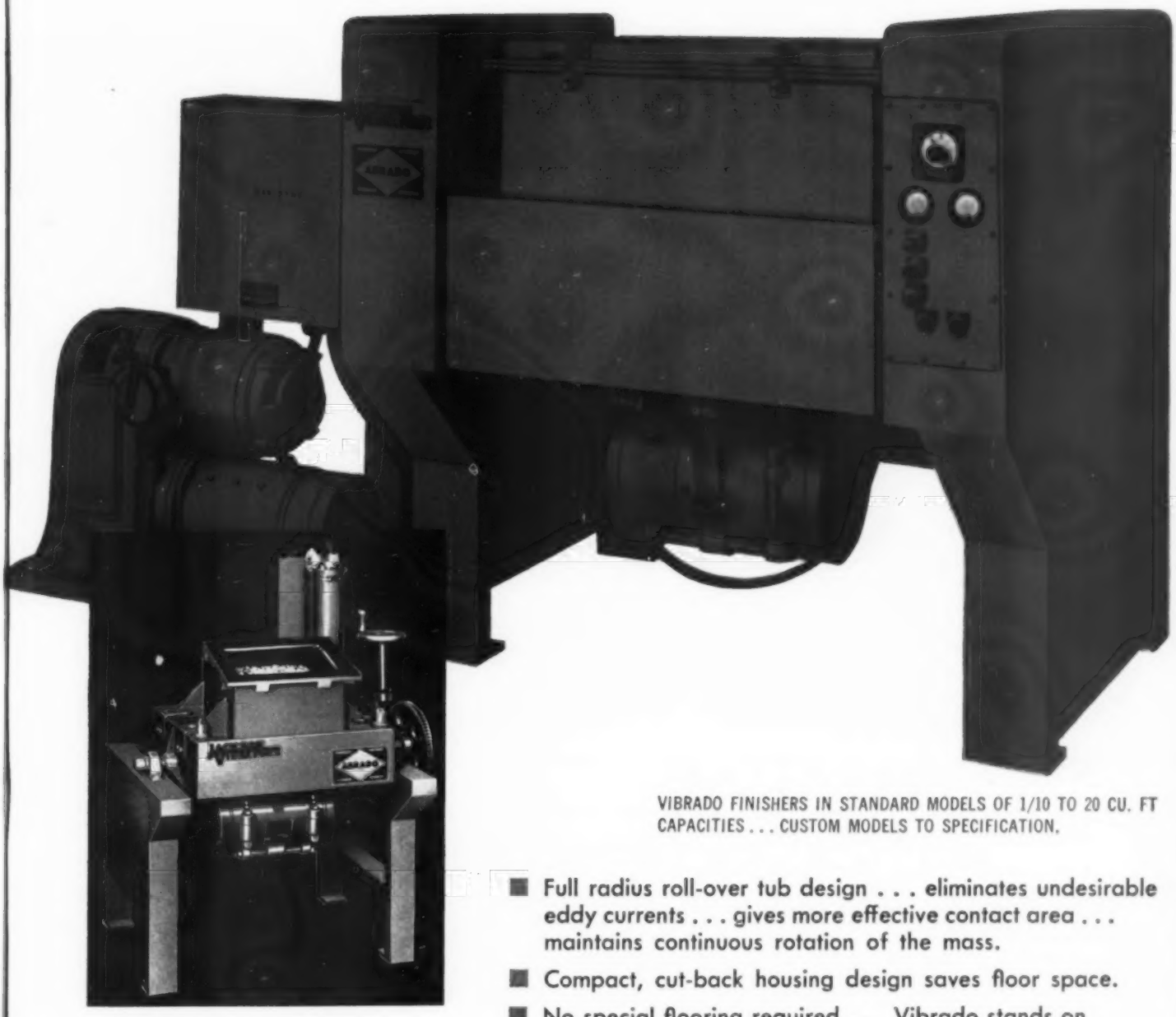

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HOLE	7/8"	7/8"	7/8"	HOLE	7/8"	7/8"	7/8"

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Dateline: Industry's Economy

Personal incomes in 1960 totaled about $400 billion, a record $2,223 per person. While the total increased by 5%, $19 billion, the per capita increase was only about 3%, or $63—and about half of that was nullified by increased prices, according to the Department of Commerce. Population growth also held down the per capita increase. High state was Delaware, at just over $3,000. Mississippi, with $1,173, trailed all other states.

Taxes collected by federal, state and local governments jumped nearly 14% during the fiscal years ending in 1960, up $13.8 billion to over $113 billion. Total state and local taxes were $36.4 billion; federal taxes $77.0 billion.

Business spending abroad for new plant and equipment is expected to rise to $4.5 billion this year, according to the Department of Commerce. The 20% increase over 1960 has been sparked by the European Common Market, which imposes stiff duties on imported goods while permitting free trade by members. Should Britain join the group, these expenditures could well rise still further.

Great Britain has frozen the pay of government employees and workers in nationalized industries as a step toward strengthening the pound. Similar action has been urged on private companies. Officials believe that part of the country's financial problems stem from wage and salary hikes that exceed productivity gains.

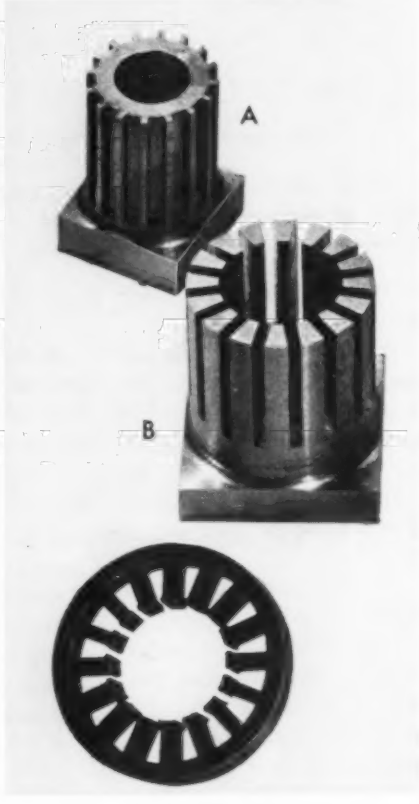
The nation's accelerated defense program is expected to bump up defense procurement expenditures almost immediately. $1,753 million of the $3.4 billion supplemental request by President Kennedy goes for procurement. Of this amount, about three-fourths is expected to be spent during the 1962 fiscal year. Total defense procurement for the period is now likely to reach $16.2 billions. With much of the new spending destined for conventional munitions and support equipment for ground forces, there should be some new business for metalworking industries, including some unexpected machine tool orders.

Price increase possibilities in steel and automobiles remain unresolved as President Kennedy plumps for present levels and company executives decline conclusive comment. Car makers would need to absorb whatever increases are negotiated with the Auto Workers, and steel faces an additional 7 to 10 cents per hour under the 1960 contract with the Steelworkers union. Last major increases came two or three years ago. New lines of cars and juggling of standard and optional equipment will make comparisons with 1961 levels difficult.

Business spending for equipment and new plants is expected to decline about 3% in 1961 from the 1960 total, according to Federal economists. For the third quarter, these outlays may hit an annual rate of $34.8 billion, would have to jump another billion plus, to an annual level of $35.9 billion, to bring the year's total to the predicted $34.5 billion.

Auto manufacturers foresee a potential 7-million car market in 1962, with estimates ranging from over 6.5 million to 7.25 million, which would make 1962 second only to 1955's high of 7,400,000. Introduction of next year's models and of new "junior" sized lines between the standards and the compacts is expected to accelerate buying. Diminished holdover stocks, with dealers hopefully carrying over less than 300,000 1961's, are also an encouraging sign.

On this Sheffield-Cavitron® Ultrasonic Machine Tool is shown the set-up for machining a motor laminator of ferrite — a material with the hardness of sapphire and the machinability of glass. Illustrated separately are a finished laminator and the two cutting tools involved. The smaller tool (A) first machines the small slots around the center of the ⅜" hole in the laminator to a tolerance of ±.001". The larger tool (B) then machines the 16 wedge-shape slots simultaneously, concentric with O.D. and I.D. within .002" T.I.R. "Working" this complex ferrite shape is typical of the capability of Sheffield Ultrasonic machine tools and NORBIDE boron carbide abrasive in broadening the machinability of modern materials.



Now it's easy–

with ultrasonic machining

...using NORBIDE* boron carbide

Yesterday, materials like ceramics, refractories and various new alloys were regarded as too hard or too brittle for conventional machining. Today, precision-machining these and many other materials is routine with ultrasonic machine tools.

Equally routine in this rapidly expanding field of machining is the use of NORBIDE boron carbide. Recommended by Sheffield and other machine tool builders, this Norton-developed abrasive has proved itself the ideal cutting agent.

Driven by a vibrating ultrasonic force, far beyond the range of the human ear, NORBIDE grit hits the work with an impact of 150,000 times the grain's own weight — *without fracturing*. Second only to diamonds in hardness and recognized as much more effective than silicon carbide grain, the Norton achievement is so free from impurities that every ounce delivers high-precision, trouble-free cutting action with maximum power and longest life.

Get more facts from your Norton Man on this tremendous advancement in modern machining. Find out how it can help you improve and economize your own production. See your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

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G-417

Making better products . . . to make your products better

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

EFFECT OF DRESSER TYPE ON FINISH

• What are the effects of different types of dressers on product surface finishes—W. J. A., Cleveland, Ohio.

Roughly, there are three types of dressers:

(a) Those which function by crushing, fracturing the surface grain to produce renewed rate of cut. In this group are the roller crush type and the star or Huntington dressers;

(b) Single and multi-point diamond dressers, which likewise fracture the grain; and

(c) Abrasive wheel truing devices which grind the wheel surface grain.

The finishes produced by (a), the crushing type, particularly the solid rolls, is almost directly related to wheel grit size. Dressing is accomplished with a plunge cut, or, at most, with very little traverse.

The finish produced by diamond dressers depends largely on the dressing technique, i. e., rate of table traverse and depth of diamond infeed per pass. Abrasive wheels used in plunge cut grinding require a finer dress than those used in traverse grinding.

Abrasive wheel truing devices, because of the angular setup, remove surface grain by a combination of grinding and dressing. Grit size of the dresser wheel affects the finish to a degree. The flattened surface is not as free cutting as that of the fractured grain, and the finish is less scratchy.

It is of the utmost importance to maintain the bearings of revolving type dressers in near perfect condition, to insure near-perfect abrasive wheel peripheral contours.

Dressing is more rapid and requires a lesser degree of experience and skill than diamond truing. Diamond truing, however, provides a means of obtaining almost any desired finish regardless of abrasive wheel grit size.

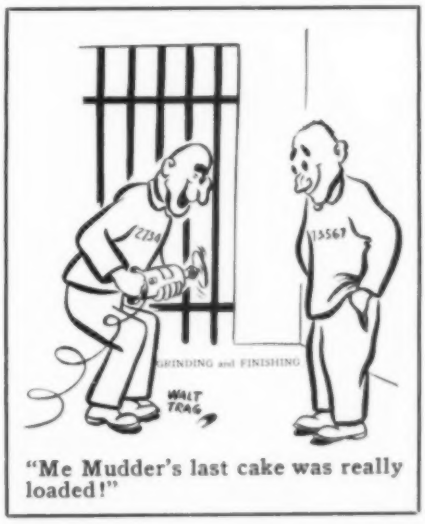
GRINDING ALLOY STEELS

• What would be your recommendations for centerless grinding Inconel X and Waspaloy for roller bearings? —J. V. K., New Britain, Connecticut.

Both of these alloys are classed as very difficult to grind. Because of their resistance to abrasion, it will be necessary to use abrasive wheel specifications that will grind cool and still remain comparatively sharp.

As you know, it is difficult to make suggestions that can be translated into definite wheel specifications. However, I'd suggest one of the premium type abrasives, about 80 grit, grade K or slightly harder if the diameters are less than 1", 8 structure, and one of the more friable bond types.

I'd also suggest that the coolant mixture ratio be held at a minimum inasmuch as the abrasive wheel surface will have a tendency to glaze rather than load.



"Me Mudder's last cake was really loaded!"

USE OF STEADY RESTS

• I wish you would discuss in the Corner the proper use of steady rests in cylindrical grinding.—I. H., Fort Wayne, Indiana.

The use of steady rests in cylindrical grinding is a subject that deserves more attention than is commonly given. There are probably thousands of cylindrical grinding applications that could be definitely improved by their use.

However, because of the general lack of information as to their proper use, and waste of production time from their misuse, they are not generally used.

The fundamentals of steady rests are simple: they support work that would otherwise be forced out of round by wheel pressure. A brief discussion here, however, would undoubtedly miss many of the important points in their use. A full discussion would be more suited to the main editorial pages. (Editor's Note: A feature article on the subject is in the works.) • • •

From the Norton

Deburring time reduced one-half at AiResearch

The SWECO *Vibro-Energy Finishing Mill* has reduced deburring time 50% at the Garrett Corporation's AiResearch Mfg. Div., Los Angeles. Before installing the SWECO Finishing Mill it took 10 minutes to deburr one part. Now the SWECO Mill does many parts at once. ⌘ Originally AiResearch ordered two SWECO Finishing Mills. After checking results, four more were ordered. ⌘ AiResearch manufactures precision aircraft, missile and other military equipment where finishing is highly important. SWECO'S Vibro-Energy principle produces a controlled, consistent product, with all surfaces, even edges and recesses, uniformly finished. The open-top design makes it easier to inspect parts without stopping the unit. Cleaning and changing of media have been simplified because unlike other mills which have to be tilted for unloading, the SWECO Finishing Mill practically unloads itself when the plug is pulled. ⌘ For full details, application data, and a laboratory test using *your* materials, write SOUTHWESTERN ENGINEERING CO., 4800 Santa Fe Ave., Los Angeles 58, Calif., Dept. 89426.

SWECO

*Vibro-Energy*finishing mills, separators, grinding mills*

* TM SEC

See our exhibit at the Detroit Metal Show, Oct. 23-27

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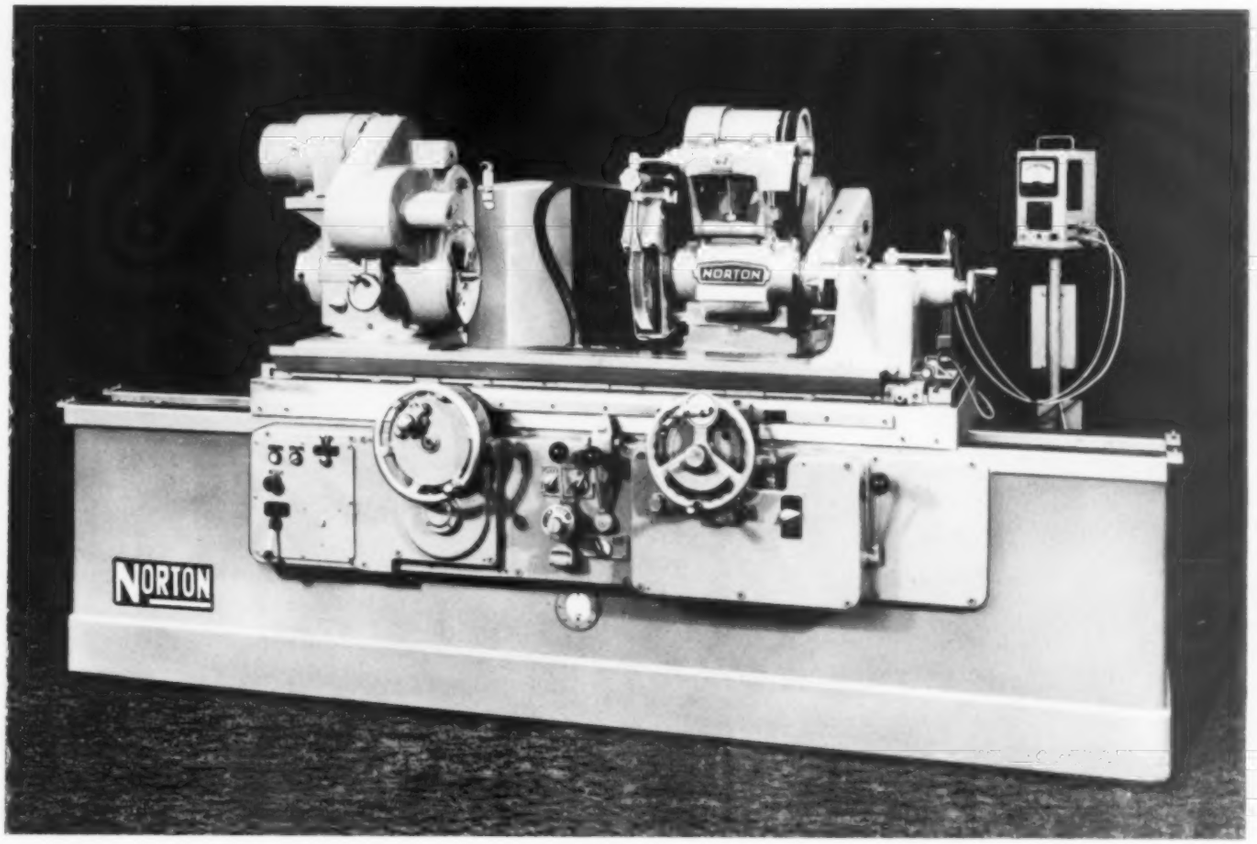
From the Norton

"FIRST FAMILY" OF TOOL ROOM MACHINES

Universal Grinders



Featuring extra versatility . . . extra fast setups

In a Norton Universal Grinder of any size — 10″, 12″, 14″, and 18″ — you get a practically complete grinding department. Versatility keynotes the design, with quick, easy setups for external, internal, face and angular wheelslide grinding — and with feature after feature increasing the job range and cutting tool conservation costs. For example:

Extremely rapid chucking . . . quick change-over to live or dead spindle operation . . . wide range of easily changed work speeds . . . independent wheel and feed settings for doing difficult jobs fast.

Available for use on all Norton Universal Grinders, the SWIVALIGN* Dual Electric Indicator, shown here on a 14″ Type U-4, eliminates cut-and-try in establishing swivel table alignment. Ask your Norton Distributor or write for Catalogs Nos. 170, 231 and 819.

*Trade Mark Reg. U. S. Pat. Off. and Foreign Countries

ECONOMIZE with Norton Tool Room Machines

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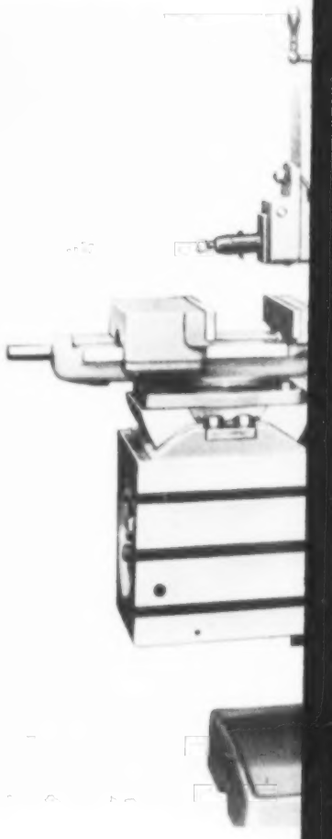

The fi

Backed by over a century of
tool building, G&E Shapers
selected ram speeds, all-helic
many other developments wit
cut time and costs.

G&E Tool Room Shapers
sizes, meet the constantly
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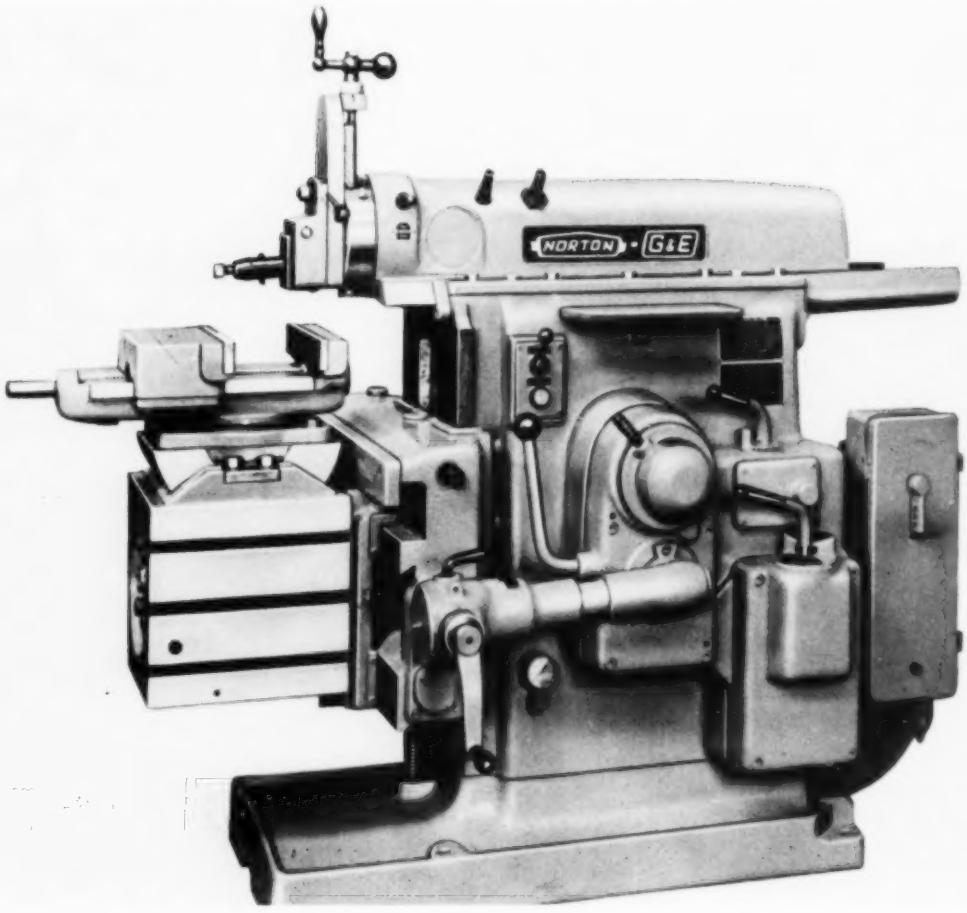
MODERNIZE

From the Norton

"FIRST FAMILY" OF TOOL ROOM MACHINES

G&E Tool Room Shapers



The finest for generations

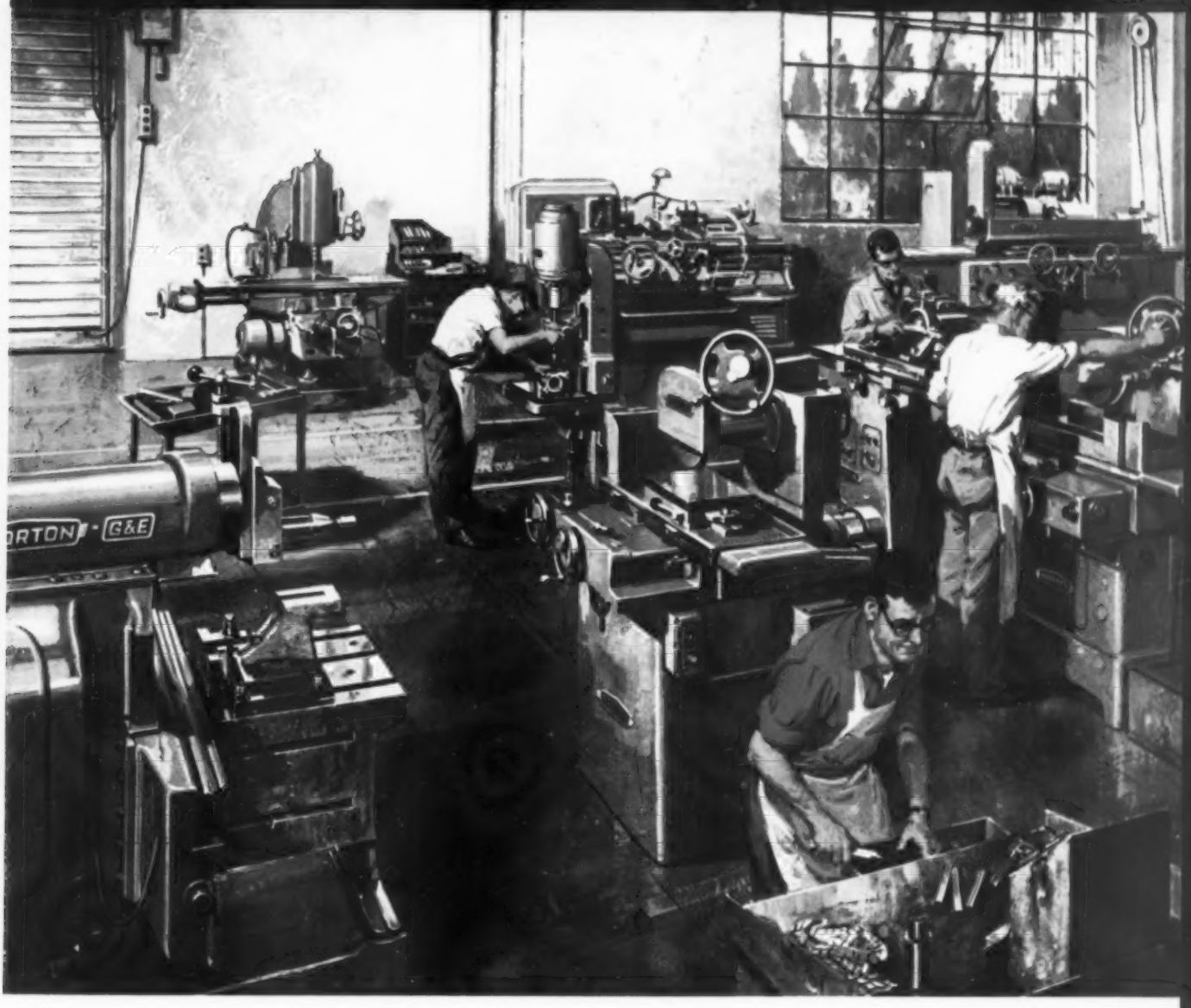
Backed by over a century of precision machine tool building, G&E Shapers feature 16 easily selected ram speeds, all-helical gear drive and many other developments with proved ability to cut time and costs.

G&E Tool Room Shapers, in 14″ and 16″ sizes, meet the constantly expanding field of shaper work and are outstanding for miscellaneous tool room and heavy die work. Convenience of controls and ruggedness of construction enable these machines to produce a wide range of variable flat and compound angular surfaces.

Featured on Norton-G&E Shapers are: Hard chrome ram V-ways for constant accuracy and long life; crossrail and table slide design that provides 60% more bearing area and 50% greater rigidity; central controls are conveniently located for easy selection of the 16 ram speeds and 18 feeds; operator can adjust table and lock crossrail from control side; built-in horizontal and vertical rapid traverse to work table, with safety clutch, always operates in *opposite* direction to feed set. Ask your Norton-G&E Distributor or write for Catalog No. 2342.

MODERNIZE with Norton Tool Room Machines

Meet the
"FIRST FAMILY" OF TOOL ROOM MACHINES



It's easy to know the Norton Family of Tool Room Machines. Their home is the modern tool room — and their scope is as broad as industry.

Above, you see them on the job — with each Norton machine adding its own special advantages to an efficient tool room operation. On the reverse side you'll find each member of the Norton family described in detail.

Specifically, the family includes a No. 200 Cutter and Tool Grinder; a Type S-3 Hydraulic Surface Grinder; a Type TS Hand Surface Grinder; a Type U-4 Universal Grinder; a Norton-G&E Shaper.

Separately or as a group, this "First Family" will bring top-ranking efficiency and economy to your own tool room — will help you maintain tools or produce jigs and fixtures that perform better . . . last longer.

For details on how Norton tool room machines can benefit your own operation see your Norton Man, a trained Machine Specialist. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Mass.

District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit; In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

NORTON
MACHINE TOOLS

Making better products . . . to make your products better

From the Norton

"FIRST FAMILY" OF TOOL ROOM MACHINES

No. 200 Cutter and Tool Grinders

The wheel head TILTS 30° ... ORBITS 360°!

No time-wasting "cut and try" routine with the Norton No. 200 Cutter and Tool Grinder . . . no more wrestling with tricky setups.

You can tilt the wheel head up to 15° above or below horizontal — and swivel it through a full orbit of 360°. For the first time with a tilting wheel head, the Norton two-speed grinding wheel spindle provides the right speed for large or small wheels.

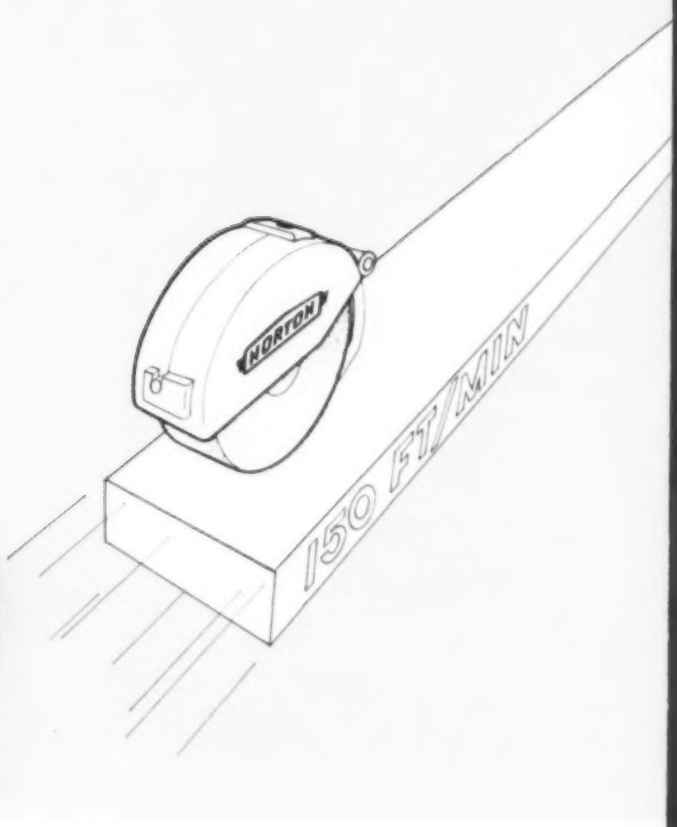
A wheel head scale provides quick direct reading of clearance angles. The wheel head can be adjusted to eliminate many of the usual settings and time losses. And the table has a rugged guide bar for precision in tracking during the toughest grinding jobs.

Also, the No. 200's extremely solid grinding action brings you excellent finish on tool cutting edges, for longer lasting, better performing tools. Other features include: wheel-slide construction to eliminate possibility of work overhang; anti-friction elements under table to provide fluid table motion; dual, centrally-located controls to simplify operation from any position. Ask your Norton Distributor or write for Catalog No. 1371.

From the Norton

"FIRST FAMILY" OF TOOL ROOM MACHINES

Type S-3 Hydraulic Surface Grinders



FINISH FLAT FASTER!

Popular for a wide variety of tool room grinding, as well as long production runs, Norton Type S-3 Surface Grinders have given complete proof of their ability to finish smoother, faster, at lower cost.

Now, S-3 Grinders are available with a new maximum table speed of 150 fpm as standard. With higher table speeds, the stock removal rate is increased and the grinding time is reduced in proportion to the increase in stroking rate. The faster table speeds also provide extra cool grinding action that reduces heat damage to the work. Time and money are saved on every job.

Sizes of the S-3 Grinders are 6″ x 18″ and 8″ x 24″, both being equally fast, cool and accurate grinding. Taller workpieces . . . up to 15″ on the 6″ size and 13¾″ on the 8″ size . . . are easily handled. Other job-proved features include a two-speed .0001″ increment hand wheel, for accurate vertical speed and fast positioning, and contoured splash guards for better visibility. Ask your Norton Distributor or write for Catalog No. 1772.

ics • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes MACHINE TOOL DIVISION: Grinding and Lapping Machines — G&E DIVISION: Shapers •

"FIRST FAMILY" OF TOOL ROOM MACHINES

Grinders

Type TS Hand Surface Grinders

ER!

ved on every job.
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orkpieces . . . up to 15″
4″ on the 8″ size . . . are
job-proved features in-
″ increment hand wheel,
eed and fast positioning,
ards for better visibility.
istributor or write for

New . . . for your daily tool room jobs!

Available in sizes 6″ x 12″ and 10″ x 16″ the new Type TS Hand Surface Grinders bring you these typical Norton advantages for tool room machines:

Precision Performance. Wheel feed hand wheel has graduations of .0005″ for fast, accurate positioning, plus a vernier scale graduated .0001″ for precise grinding feeds. The long, rigid vertical slide and saddle provide greater support for moving parts, reduce vibration and improve finish. Accurate cross-feed is excellent for groove and shoulder grinding.

Easy Operation. Controls at working height are quickly accessible; design enables easy seated or standing operation. Handwheels eliminate cross-arm operation of table and cross slide. TS Grinders are the only machines of their type with hinged wheel guard for quick wheel change.

Overall Economy. Strengthened by many other simplified, long-lasting features for clean, uncluttered design which reduces maintenance costs. Ask your Norton Distributor or write for Catalog No. 388.

Grinding and Lapping Machines — B&E DIVISION: Shapers • Gear Cutting Machines

NORTON
MACHINE TOOLS

Printed in U. S. A.

Octo

Metalworking on the move

U. S. exports are showing an encouraging upswing as more and more companies, small and medium-sized as well as large, find markets abroad. Successful marketing abroad has required changes in practices and modifications of product, adjustments to conditions as they are. Increased service, emphasis on products that have fewer tariff restrictions, and the effects of trade missions and exhibits sponsored by the U. S. government have also helped. Some companies are finding that they can apply mass production methods to cut costs on delivered products below those of their foreign competitors.

A lighter, thinner tin plate, with less tin and lower prices than have been customary, is now available. This could mean stiffer competition for aluminum, which is said to have taken over more than half of the frozen citrus juice market in 1960-61.

The Kaydon Engineering Corp., Muskegon, Michigan, is investing more than a million dollars in plant improvement and expansion this year, with the major project a 15,000 square foot plant addition. Other improvements include a massive rearrangement of departments to improve work flow and minimize material handling, centralization of similar operations, and purchase of new machines and equipment. The addition increases Kaydon's total plant area to 186,000 square feet, more than five times the area of the original plant in 1941.

Business activity continued to rise as the nation entered the second half of 1961. Industrial production in July set a new record, topping the January, 1960, level by 1% (1957 = 100). Durable goods were nearly 3% above the previous month; nondurables went up 1% to a new record. Iron and steel production were at their highest level in 14 months. New orders received by manufacturers of durable goods totaled $14.9 billion, highest since July, 1959. Construction expenditures hit an annual rate of $58.7 billion with increases in both private and public outlays. For the first seven months of 1961, housing starts were only 3% behind 1960, are expected to catch up and possibly pass 1960 by the end of this year.

Productivity of U. S. industry rose a below-average 2.5% in 1960, with output per man hour in agriculture hitting a 6.2% rise, topping its postwar average of 5.8%. Non-agricultural areas, however, at 2%, lagged behind the postwar average of 2.5%. Productivity, or output per man-hour, is a measure of the economy's over-all efficiency, does not necessarily reflect the efforts of any single segment—labor, management, or capital. Improvement reflects the net bettering of efficiency in all three segments, but the index is not geared to show the performance of any one.

The fourth traveling educational show of the DoALL Company is a 46½′ exhibit of major events that began with the Industrial Revolution and brought man to his present state of material welfare. Starting a three-year tour last month, it will be shown before engineering societies, civic, management, and educational groups. Called "The Story of Productivity," the display is built around an 8′ "sunburst" that records in ten classifications 157 major events that ushered in man's present age of abundance. Flanking the sunburst on each side are 6 display panels and tables, and above four of these are life-size busts of great innovators.

.0002" vibration level vs. .000002" vibration level—that's the difference between commercial and precision balancing with a Stewart-Warner Industrial Balancer. This *big difference* in ability to meet tolerances can make *the* big difference in the quality of your work and in the economy of your operation. By keeping your grinding wheels in precision balance, you'll *save in many other ways* . . . through longer wheel life, fewer dressings, and less rejects.

Precision balance can be obtained right on the grinder—without removing the wheel. The monitor feature warns the operator when vibration exceeds a pre-set amount – before the cut is taken.

Send for free, fully illustrated catalog today describing not only this monitor and balancer but the complete line of Stewart-Warner Precision Dynamic balancing machines.

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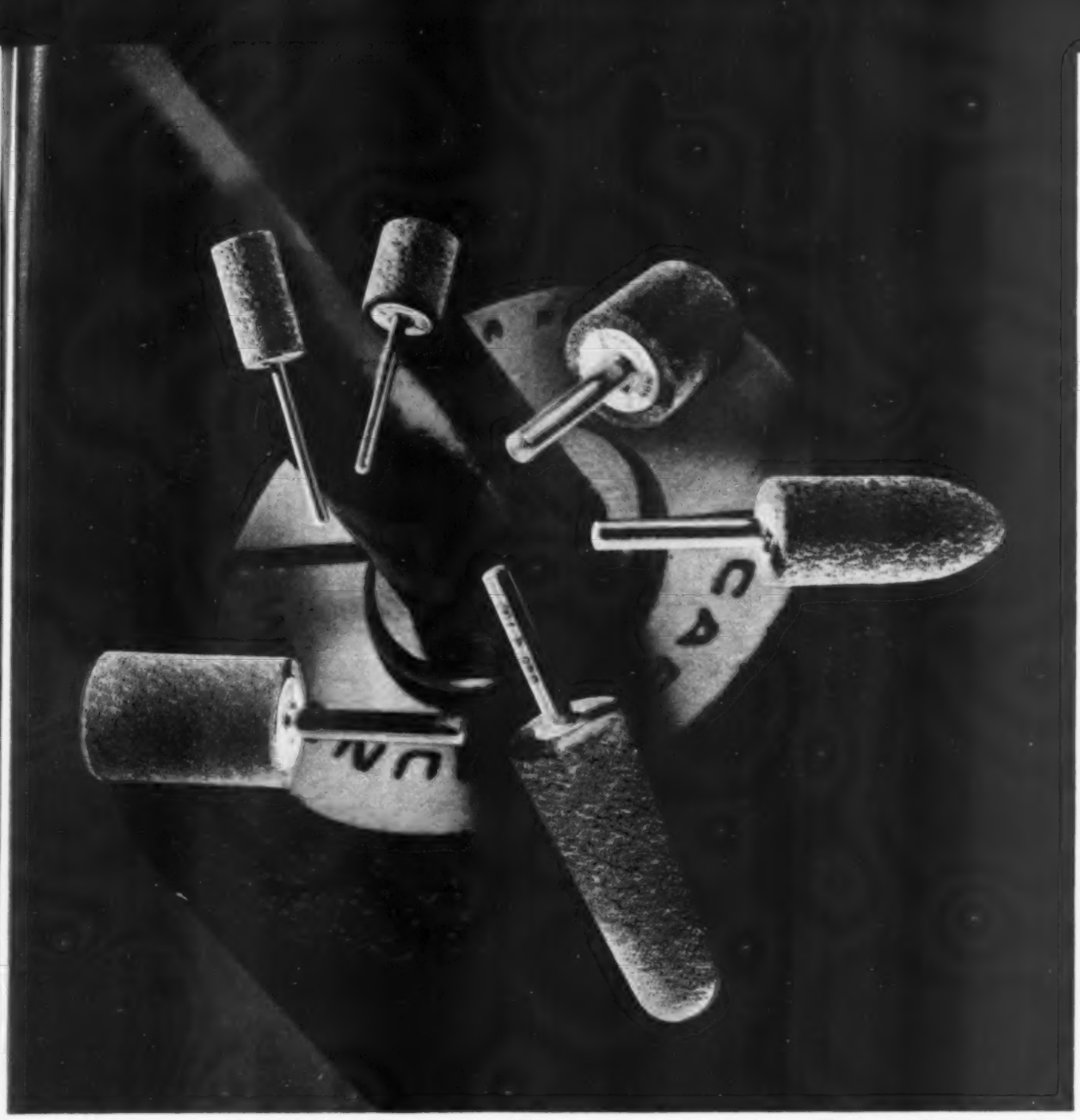

NEW... Metal-Lock Mounted Wheels

... extra strength for trouble-free portable grinding

Mandrel failure, wheel breakage and fly-off is reduced to a minimum with Carborundum's new Metal-Lock Mounted Wheels. With mandrels actually metal-fused to the abrasive, the Metal-Lock Mounted Wheels withstand extreme heat and vibration on the roughest of grinds. The abrasive can be used effectively right down to the mandrel. Clean, even metal mounting also assures precise balance in every wheel. Carborundum's Metal-Lock Wheels are identified by the new red and white blotter... call your Carborundum distributor for a demonstration. Bonded Abrasives Division, Niagara Falls, N. Y. **CARBORUNDUM**

METAL-LOCK MOUNTING. Die-cast metal in molten stage is injected into wheel under pressure, fusing it to the abrasive grain (circle) to produce this new more durable mandrel bond.

TORTURE TEST PROVES STRENGTH. Metal-Lock Mounted Wheels were subjected to a series of torque stress tests in Carborundum Laboratories. In each test, at point of maximum stress, the ¼" stainless steel mandrels snapped off before there was any evidence of yielding between mandrel bond and wheel.

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UNLOCK GRINDING POTENTIAL

...take the BESLY 3G ROUTE

What is the Besly 3G Route? Simply the most direct path to achieving fullest grinding potential. It's a plan of analysis that will help you get the greatest economy, the finest quality and the highest level of production from your grinding operations. Here's the way it works:

G1 The *abrasives* you use are examined and studied under the conditions in which they are used to discover if they are right for the job and if they are reaching potential.

G2 Your Besly grinding *specialist*—your G²—prepares your routing to potential. Abrasives, coolants, methods, materials and machines . . . all are explored for potential, for improvement.

G3 The grinding *machines* that you use and those available are evaluated in the light of your grinding needs. The machine that will produce to your potential is recommended.

NEW BOOKLET! Tells how you can increase grinding potential. Write for your copy today!

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Drills • Reamers • End Mills • Tool Bits • Gages
Carbide Tipped Tools • Blanks • Inserts • Holders

ASK YOUR BESLY G² FOR AN ABRASIVES PERFORMANCE TEST—1—Tell him the material to be ground. 2—Tell him the amount of stock to be removed. 3—Tell him the finish required. 4—Tell him the area in contact with the abrasive. 5—Tell him the spindle speed. He'll do the rest!

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Design for Grinding

RICHARD L. McKEE • Managing Editor

Surface grinder replaces **three** planers

Switching the side finishing of press brake dies from planing to surface grinding cuts time to 25% or less of previous level, with one grinder doing the work of three planers.

First passes across the sides of rough 2" x 5" x 12'6" bars for press brake dies. Only a high spot on right-hand bar has been touched at this point, but in fifteen to thirty minutes all three will be finished on both sides and ready for the tongue-cutting operation.

• In making press brake dies at Dreis & Krump Manufacturing Co., Chicago, accurate finishing of the sides of the rough bars is essential for precise cutting of the tongues. When this was done by planing, the time on typical bars might run from an hour and a half to over two hours. On the surface grinder it runs from a quarter to half an hour on the same size bars.

Some typical rough sizes of dies would be 1" x 3", 1" x 4" and 1" x 6", and 10' 6" or 12' 6" in length. The tongues are cut on the edges. Finished dies might be anywhere from 6" to (in sections) 52' long. The chuck on the Mattison 400SS vertical spindle surface grinder accommodates pieces up to 14' long.

The first operation on the rough bars is to remove all scale and rust from the sides, and to finish the side flat and parallel. With the surface grinder the chuck can be loaded to full length and width (the photograph shows three bars).

The bars must of course be flat and parallel, but the company tries to hold stock removal to a maximum of 1/16" per side, to give the customer as sturdy a die as possible.

After the roughing passes are completed, the operator dresses his segments and gives the bars a final finishing pass, providing an improved surface over that possible with planing. This is an important point with Dreis & Krump, because the company makes a point that its dies are finished all over.

When one side of the bars is completed, the bars are turned over for grinding the other side.

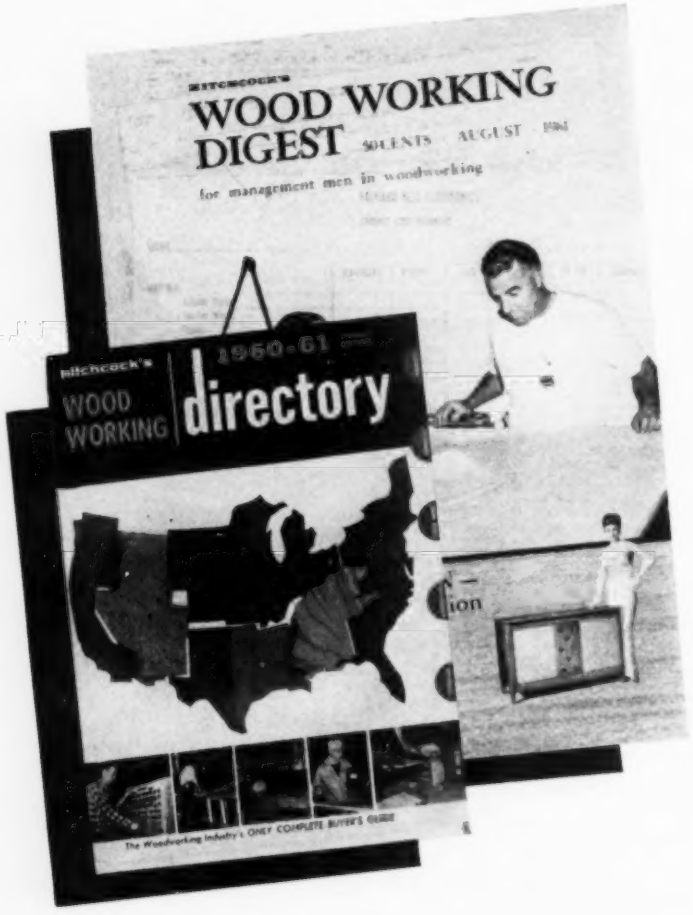
Segments currently in use are vitrified semi-friable aluminum oxide, 24 grit, I grade, open (14) structure.

Some typical illustrations of grinding vs. planing time are the following:

Bar Size	Grinding Time	Planing Time
1" x 3" x 12' 6"	15 min.	90 min.
1" x 4" x 12' 6"	22 min.	110 min.
1" x 6" x 12' 6"	30 min.	130 min.

The reduction in time has released three planers for other work. • • •

For management men *in woodworking*



Wood has always played a vital part in our growth and heritage. There is no other basic material available to industry that is as flexible for conversion into useful materials. The future of wood in the next ten years can be as rewarding as it has been in any period in our history if the basic production tools of the wood working industry are modernized.

This industry is gradually losing its entrenched resistance to change and is planning for modernization to meet the challenge and competition of other products, materials and techniques. The wood working industry can be a dominant factor in our economic life in this next decade if immediate steps are activated to close the obsolescence gap of production equipment and modernize all of the antiquated and inefficient equipment and techniques.

HITCHCOCK'S WOOD WORKING DIGEST has been serving the wood working industry since 1898. Today it is published to give "the management men in woodworking" the vital facts and information they need with which to meet the challenge for a revitalized industry.

These new publishing concepts are increasing editorial impact—new publisher organization—new editorial compression—new editorial news features—new cover designs—new art and layout format—new type faces and engravings—new and improved paper stocks. Increased market coverage and penetration with a circulation effective January 1962 of 20,100 at a new low rate per thousand. Increasing the important buying influences.

HITCHCOCK'S WOOD WORKING DIRECTORY is the only hard-covered, authoritative Directory serving the wood working market. Issued biennially, it has been the industry's primary guide for the purchase of woodworking equipment and supplies since it was first published.

Over 15,000 copies of HITCHCOCK'S WOOD WORKING DIRECTORY are used constantly at the time of selection and purchase by the key buying influences in the entire wood working industry.

PLANT MANAGEMENT and ENGINEERING
"For the men in industry who plan for tomorrow."
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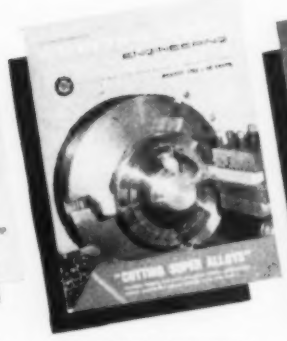

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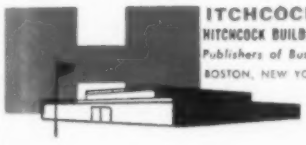

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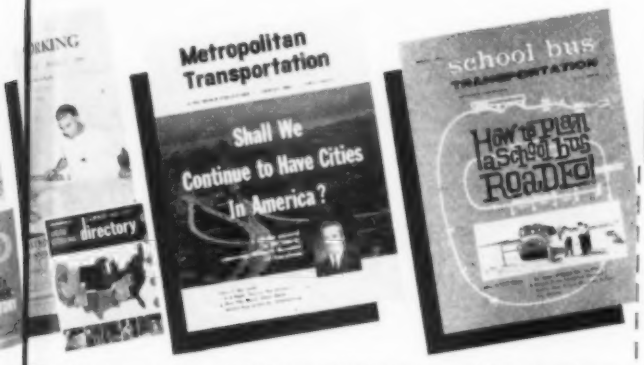

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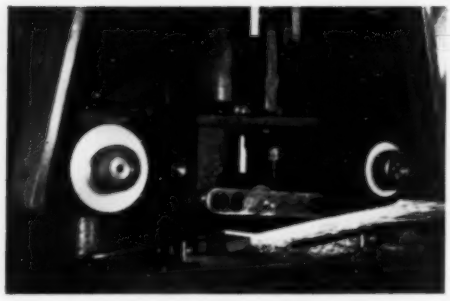

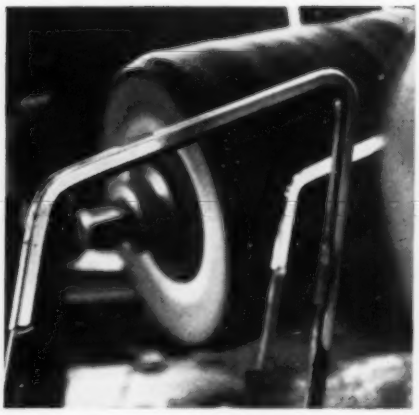

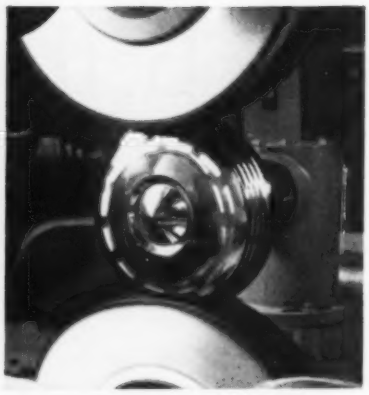

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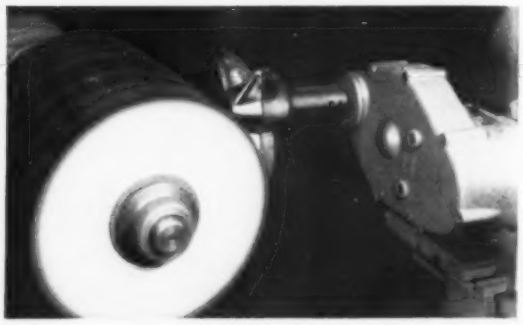

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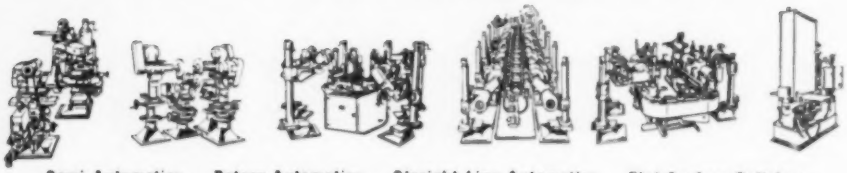

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RUBBER HOSE MAKES GOOD WORK DRIVER

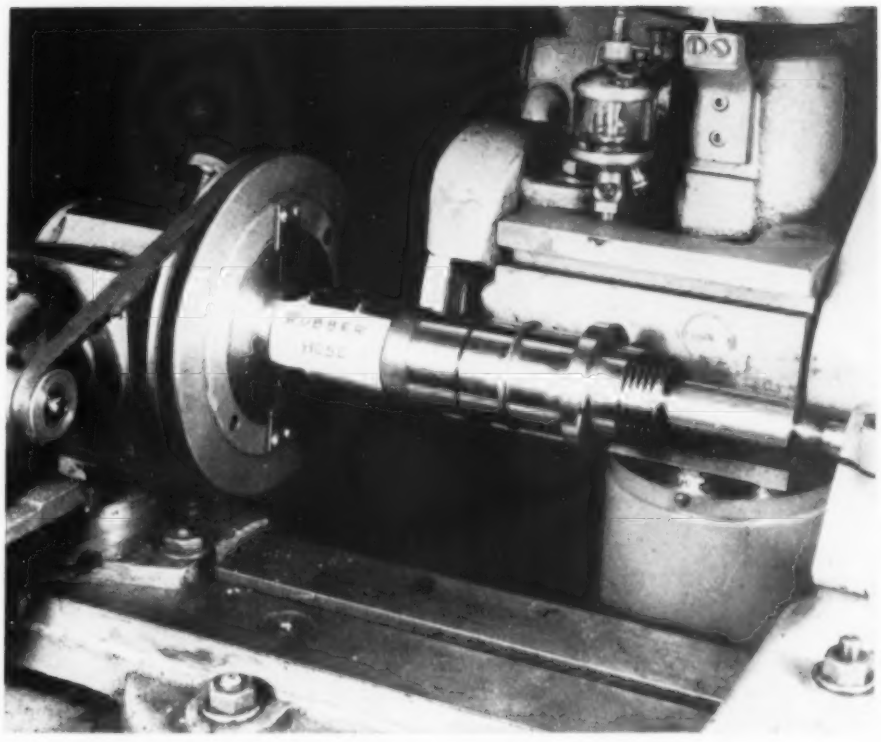
By H. J. GERBER

• A short section of stiff rubber hose makes an efficient work driver on the cylindrical grinder. The hose section is placed between the end of the work and the headstock spindle nose of the grinding machine when the work is seated on centers.

This arrangement has proved to be much faster to set up than the usual method of clamping a dog on the work or on a mandrel on which the work is mounted.

Care must be taken to cut the hose to the length which will ensure accurate seating of the work on centers and yet contact the work tightly enough to turn it through frictional contact.

One application on which this driving method has proved to be of particular help is on jobs which must have the complete length of surface ground in one set-up, and which would be impossible to grind in that fashion if a dog were used on one end. The hose section, seated tightly between the end of the work and the spindle nose, permits traverse over the full length of the work.



Stiff rubber hose set up as work driver on cylindrical grinder.

PRECISION GRINDING OF RUBBER TUBING

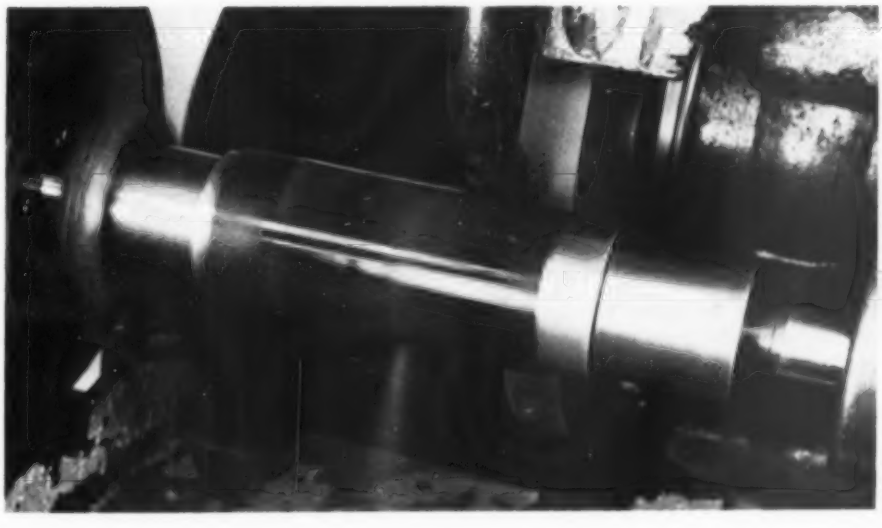
By JOHN DAVIES

• Our work often involves the building of scientific research apparatus which imposes the need to perform out-of-the-ordinary operations on many types of material.

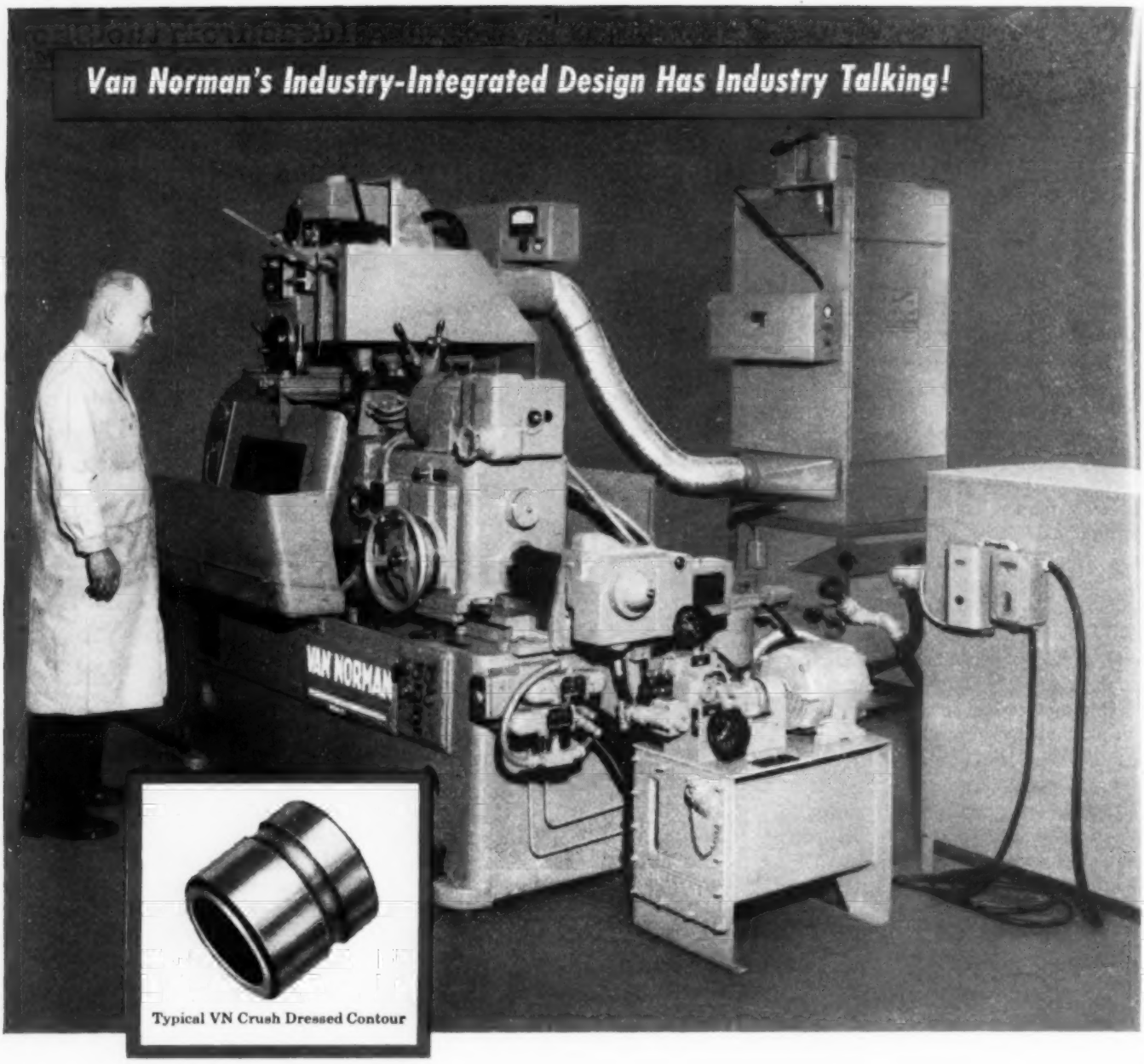
Among the unusual jobs we have performed on the cylindrical grinder is this one. It required the production of a number of rubber sleeves which were to have an extremely precise and uniform wall thickness along with a taper of .022″ in 6″ of length.

Stock rubber tubing was modified by grinding the tube between centers on a special mandrel made for the job. The mandrel diameter was carefully calculated to hold the tubes securely without excessive stretch.

Talcum powder sprinkled on the ID of the tube facilitated its installation on the mandrel.



Mandrel supports rubber tubing for grinding precise taper.



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Apples and Oranges

How many times have you read a listing of metal removal operations such as this: milling, drilling, reaming, turning, boring, grinding, planing and broaching? Did you stop to think that this was like the apples and oranges situation? This single term, grinding, has been used to cover cylindrical, (centerless and center type), snagging, lapping, honing, internal, roll, surface, flat (coated), barrel finishing, drill pointing, blasting, and others, each of which is just as unique and important as the other types of metal removal processes listed.

Why does this situation exist? Why does it represent the attitude of metalworking management to abrasive machining?

First let's go back a few years. Selling abrasives before the second World War was done on the premise that what the customer didn't know would keep him coming back. There were no standard markings and very little technical information available on theory or application of abrasives. Salesmen and abrasive engineers guarded jealously every hard earned bit of information.

The metalworking industry accepted this situation and did very little to combat it. "Why should we? Every time something goes wrong we just call what's-his-name. He'll help us and then we don't have to bother." It all looked complicated at that time and the jobs involved were tool sharpening or getting a special finish on one or two parts. Or maybe they needed extremely close tolerance on that new hard material on the special order. At any rate, the jobs could be solved by the abrasive man in sufficient time.

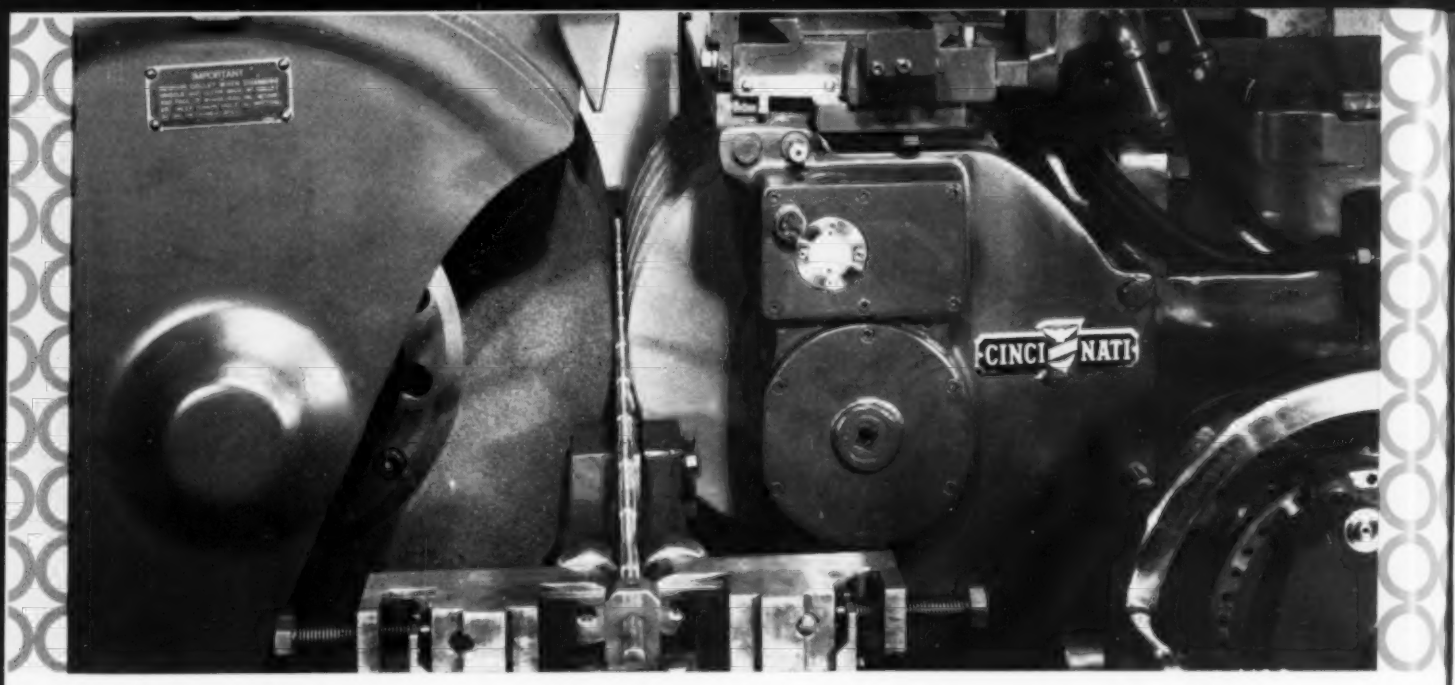
Just prior to and during the war, the urgency became greater and much more important. New tougher metals with high finish and closer tolerance requirements put a heavy demand on the knowledge of these abrasive men. Many were brought into the metalworking industry because of their knowledge of abrasive application. It was during this period that many of the present production applications of abrasives really became established and standard wheel markings were developed.

Since the war, manufacturing companies have taken one of two directions. The majority have gone back to the old system of letting the abrasive representative tell them what to do and how to do it. A few have taken steps to correct the problem by developing their own personnel and conducting their own process development of abrasive operations. These companies have profited from their approach.

When are you going to wake up to the fact that abrasive machining can benefit you, your company and American industry? Most of you are not taking advantage of abrasive machining, not because of the chance you take on the processes, but because of the limited knowledge. What we don't understand we fear. Yet in the last six years there has been a tremendous amount of information published on the subject. Stop adding apples and oranges!

W. W. Patterson

Editor, Grinding and Finishing



Centerless: high production OD grinding

By RICHARD L. McKEE • Managing Editor

Centerless grinding is a widely-used process whose applications for both OD and ID grinding are growing as users learn more about it, and as new techniques are developed. First article of this new basic series describes the process, lists its advantages, and broadly outlines a variety of applications.

● Centerless grinding, to many users, is automation. It suggests the ultimate in "no hands" abrasive machining—hopper feeding, long production runs, operators handling several machines, high-speed electronic gaging, conveyors running hither and yon—the works!

Centerless grinding is all this, and more. As its potentialities have become better known, its applications have widened out, both on repetitive work where high production is essential and on many small-lot cylindrical parts where factors such as concentricity, precision and balance are critical. It has become a widely-used internal grinding process where concentricity of ID and OD is vital.

Abrasive belts have been substituted for the grinding or regulating wheel, or both. Buffs, flap-type wheels, and brushes have used the same principle. Gaging in centerless grinding is a field in itself. Feeding and conveyors make up another.

This series is limited mainly to the discussion of the centerless grinding process, with only incidental references to "before and after" handling, processing, and inspection.

Advantages of Centerless Grinding

Following are some of the plus factors for centerless grinding:

1. Grinding time is virtually continuous, once the machine has been set up. In through-feed operation there is no break between pieces, and they are ground consecutively as they follow one another through the grinder.

2. Vibrating hoppers and gravity feed chutes can be easily used with through-feed work, while bolts and similar objects can be fed by automatic fixtures. Form-ground pieces can often be automatically fed by a gravity feed chute and an air-actuated pusher rod.

3. The work is rigidly supported under the grinding cut and along its full length. No deflection takes place during grinding. This permits heavier cuts without concern for distortion from wheel pressure, and the grinding of long slender pieces, even wires, that could not be ground between centers.

4. Less grinding stock is required, as a true floating condition exists and possibilities of errors in centering are eliminated. This in turn reduces wheel wear. The centerless grinding method tends to grind the largest possible diameter, thus saving material, grinding time, and abrasives.

5. Material removal is measured on the diameter rather than the radius. Hence the effect of errors in set-up or in compensating for wheel wear is only half that of center-type grinding.

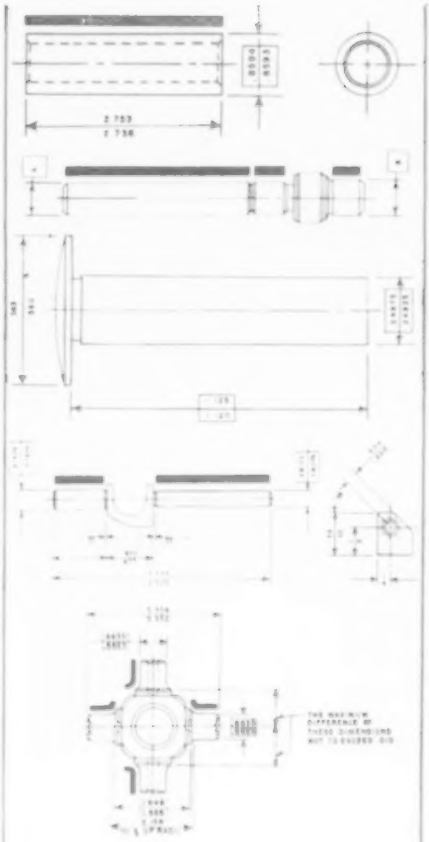
6. Without centers, there is no problem with worn or dirty center points or center holes. Centerless grinders have few wearing surfaces, and maintenance is low.

7. Centerless grinding is extremely compatible with "closed-loop" electronic gaging, by which data from ground pieces are fed back to the grinder, causing automatic adjustments for wheel wear. This results in still greater automation of the grinding process.

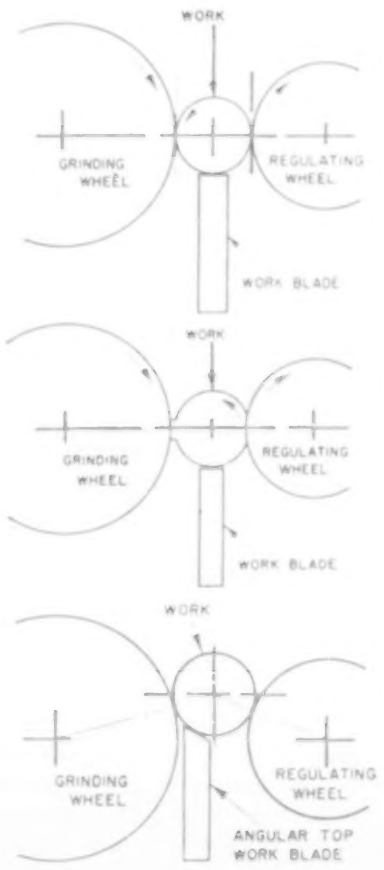
8. Once the machine has been set up, operating it is not a highly skilled job. The operator may be required only to keep a hopper or chute filled with parts, or to place and remove parts for grinding.

The Centerless Grinding Principle

Centerless cylindrical grinding is the full technical designation of the operation. As this implies, the object is the generation of cylindrical surfaces. Over the years, cylindrical grinding has come to be restricted to the center-type only. It is rarely used in reference to centerless.



Sketches of centerless work, with bars indicating ground surfaces. From top: piston pin, distributor shaft, stud, selector arm, spider.



The basis of center-type cylindrical grinding is familiar and easily understood. The work is supported between centers and rotated by a power drive while it is also traversed across the face of a rotating grinding wheel. This action creates the cylindrical surface. The diameter of the cylinder is governed by the distance from the face of the grinding wheel to a line drawn between the centers which support the work.

In centerless grinding, however, there are no center points, and no apparent method of controlling the roundness of the work. The workpiece floats between two abrasive wheels, held up by a blade underneath. The second wheel, called the regulating or feed wheel, and the blade, most often called the work rest or work support blade, are the unique elements.

The ground diameter of the work is determined by the distance between the faces of the two abrasive wheels. A constant diameter, however, does not necessarily mean a perfect cylinder.

In the simplest instance, with the work piece on a flat support and with its center in line with the centers on the wheels, any high spot on the work piece will produce a corresponding low spot diametrically opposite when it comes in contact with either the grinding or regulating wheel. Work produced with this setup will have a constant diameter, but will not be cylindrical. (See 2 sketches left.)

If, however, the center of the work is elevated slightly above the centers of the wheels by raising the support blade, a low spot coming in contact with either wheel will cause a high spot to be generated at the contact with the other wheel, but not diametrically opposite. As the work piece is rotated, the highs and the lows do not come opposite each other, but tend to cancel out, producing a gradual rounding of the piece. This action is helped by a blade with an angled top. (See sketch left.)

With the centers of both wheels being fixed, the smallest diameter on

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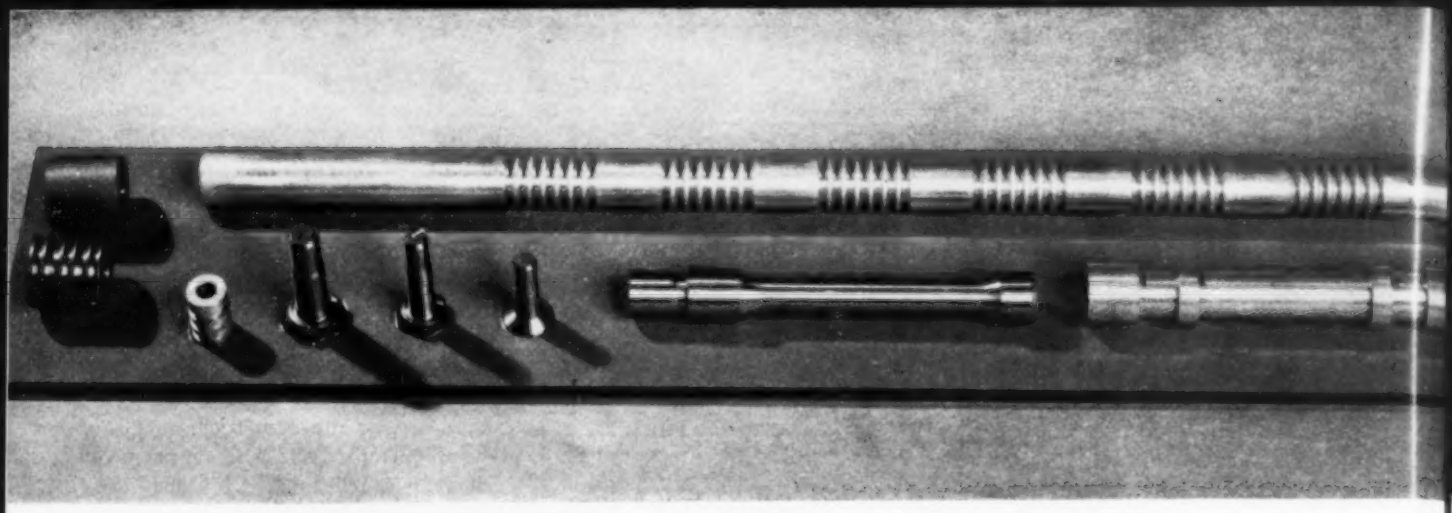
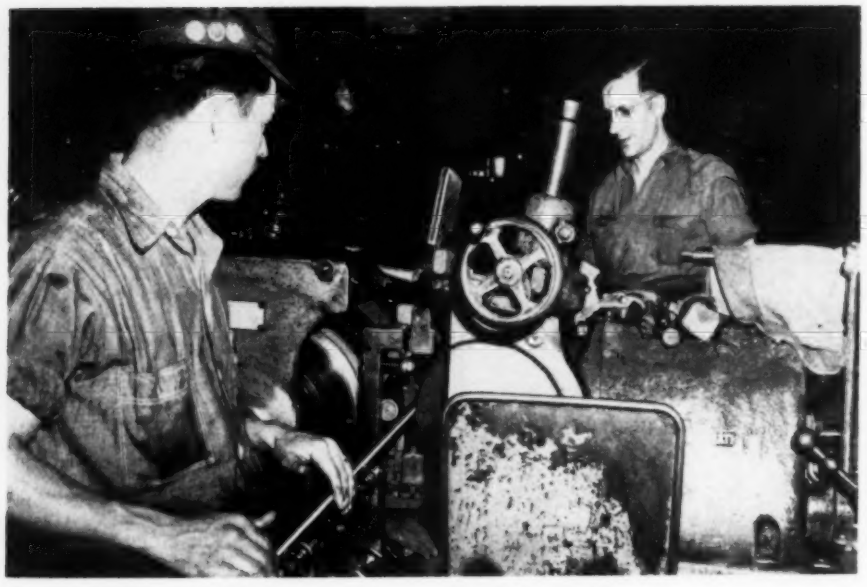
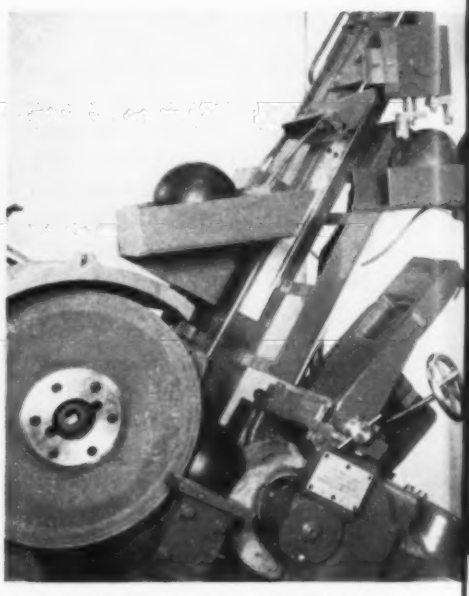


An assortment of centerless ground workpieces, primarily handled by infeeding.



Long, straight rods like these are a bread-and-butter item in many centerless grinding shops.



One centerless set-up: grinding bowling balls with form-dressed wheels.

CENTERLESS GRINDING

continued

the workpiece is generated on their center line. Correspondingly, increasing the height of the center of the work above the center line of the wheels generates larger diameters. If only a light cut is taken, only the high spots will be ground, as from the beginning the machine tends to generate the largest true cylinder that can be formed out of the irregular work piece.

The higher above center the work is placed, the quicker the rounding action. The limit is reached when the work starts to jump away from the blade because of the vertical forces involved. Soft wheels permit higher placement of the work than hard ones, because the decreased contact pressures limit the forces lifting the work from the blade.

In operation, the grinding wheel—usually 20″-24″ in diameter and 3″-8″ thick—rotates at its normal speed, around 6,000 sfpm for vitrified and 9,000 sfpm for resinoid. Its pressure forces the work down against the work rest blade and the regulating wheel.

Customarily, as seen from the feed side, both the grinding and the regulating wheels rotate clockwise, with the work turning in the opposite direction.

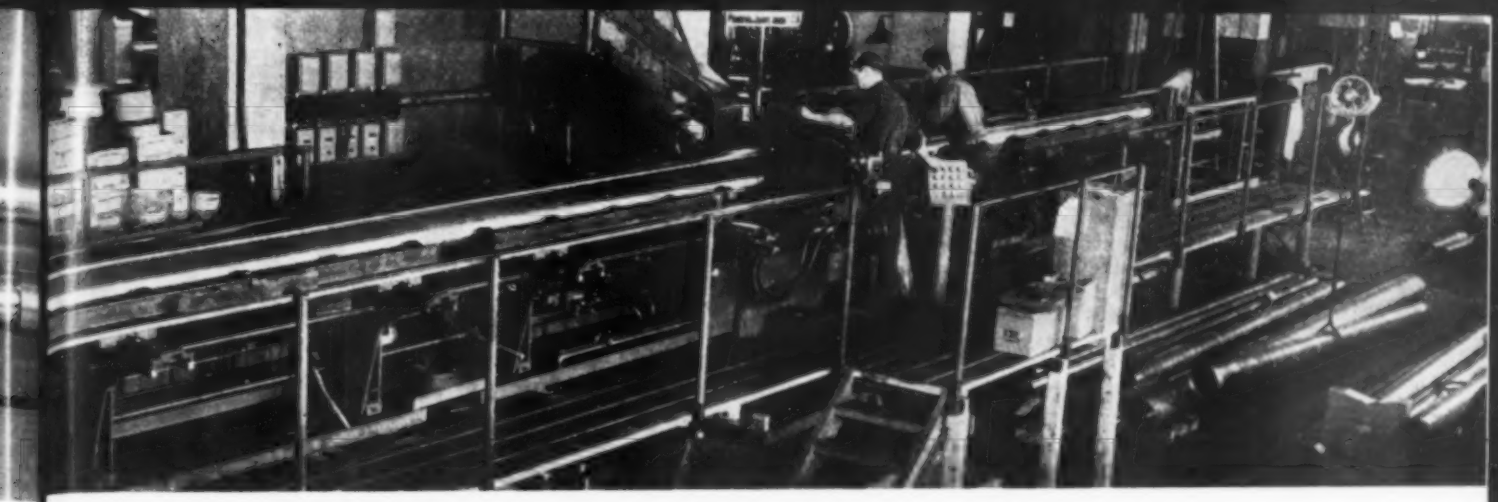
The regulating wheel is usually the same thickness and about two-thirds the diameter of the grinding wheel—12″-14″, in a rubber bond. Rotating at a speed of 25-900 sfpm, the regulating wheel brakes the work piece and keeps it revolving at a constant speed. Friction of the work against the work rest blade and the regulating wheel must always be greater than its friction against the grinding wheel, or else the work will spin out of the machine.

Other things being equal, the higher the speed of rotation, the faster the work reaches true cylindrical shape. The upper limit is attained when the work begins to chatter from too rapid rotation. The speed of the work is varied, of course, by changing the speed of the regulating wheel.

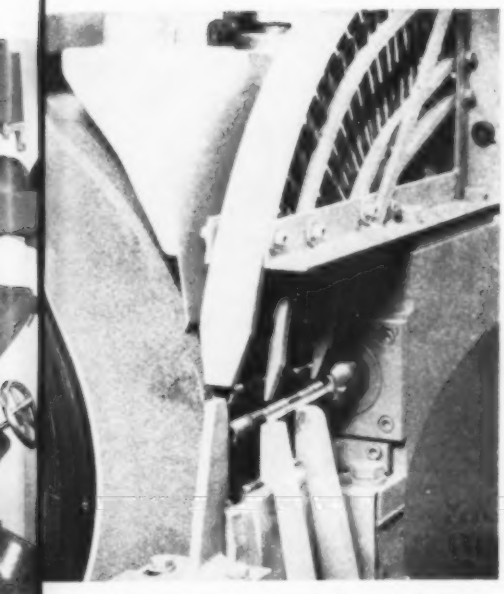
Methods of Feeding

Centerless grinding may also be considered by method of feed.

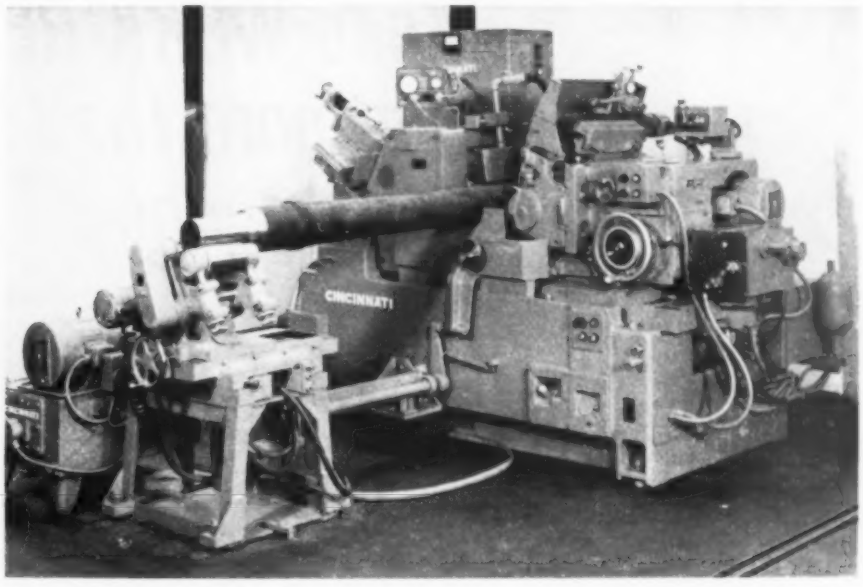
Work without projecting heads or shoulders which is ground only on the major diameter is done by the through-feed method. This means that work passes between the grinding wheel and the regulating wheel from one end of the work rest to the other. Most work is of this type.



Centerless abrasive belt set-up for grinding elevator shafts up to 56′ long.



Feed mechanism for infeed grinding of several diameters on shaft.



Grinding the journals of a freight car axle. Powered outboard rollers help rotate the heavy workpiece.

When work is ground on more than one diameter, or has a projecting head or shoulder, as a bolt, it is ground by the in-feed method. This involves laying the workpiece between the wheels by either manual or mechanical means, and then retracting it after grinding. A variation of this, sometimes called the end-feed, involves tapered wheels for tapered work. This is much more a sub-group of in-feed, however, than an independent classification.

Centerless Grinding Applications

The basic centerless grinding application might be described as a round tube or rod to be ground on the major OD, anywhere from .02″ to perhaps 4″ in diameter, and with length ranging from a fraction of an inch to whatever the shop will take.

Diameter is a result of machine capacity, but added length merely requires additional outboard supports and perhaps powered rolls on the infeed side of the machine to maintain its rate of rotation.

Though the bulk of applications, and most of the volume, is probably within these limits, they by no means cover the entire range.

It is quite possible, for instance, to grind several different diameters on a single shaft, and to grind the ID as well as the OD.

Centerless thread grinding is a growing area. Bowling, golf and billiard balls are ground routinely, as are other spherically shaped work pieces. Elevator tubes up to 16″ in diameter and 56′ long have been handled on an abrasive belt centerless. Another example is a rotor shaft for an electric motor, on which the OD of the windings could be ground so concentric with the shaft that for many uses no further balancing is needed.

Many out-of-balance parts with either straight or tapered cylindrical surfaces—heads of golf clubs, crank shafts, automobile steering knuckles, to mention a few—are also partly centerless ground, with suitable work holding attachments.

As to materials, the list is inclusive: cast iron, steel, brass, aluminum, copper, plastics, glass, rubber, alloys of steel and other metals, even cork and wood.

Later articles in this series will explore these techniques and applications in greater detail. • • •

Editor's Note: This is the first article of a series on centerless grinding. The next part will appear in December. Each article will be complete in itself, but the series will be reprinted, with copies available about a month after the appearance of the last part.

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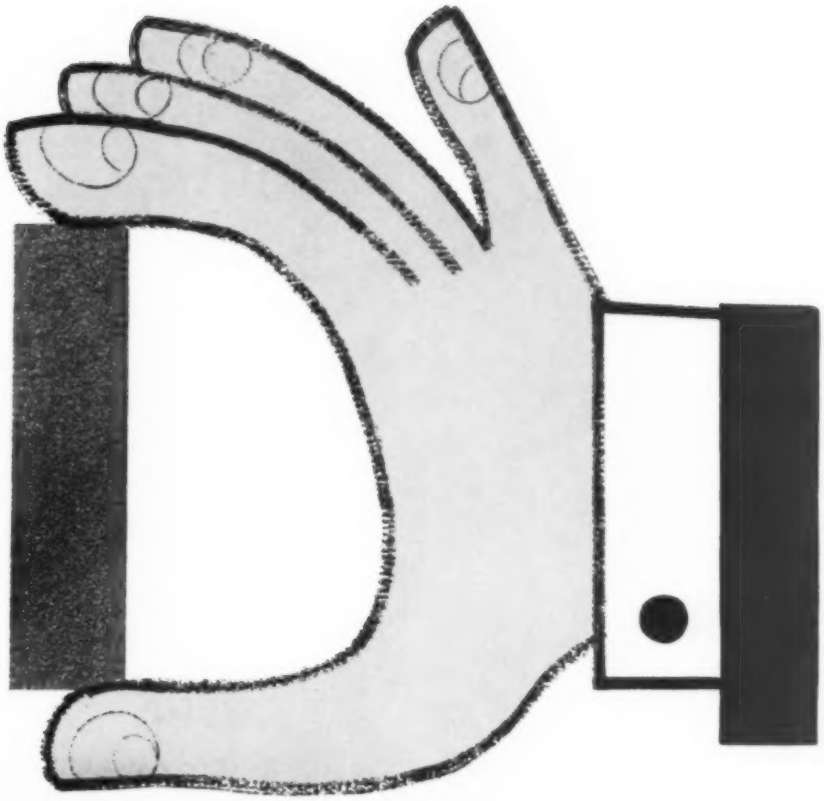

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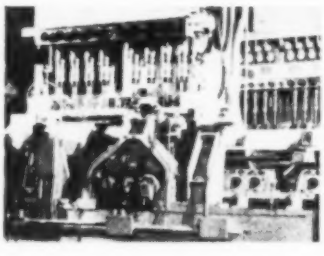

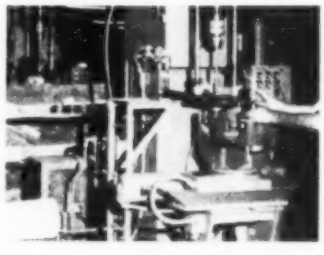

As the small hone above will keep your pocket knife sharp . . . our sales engineers can help sharpen your honing operation. By having a Mid-West Abrasive Engineered Installation, you can expect a service* that will give you 1) greater stock removal per minute; 2) shorter cycle time; 3) more wear per set of stones; 4) more exacting tolerances; 5) less distortion of parts due to free-cutting stones; 6) controlled finishes and more savings per honing operation.

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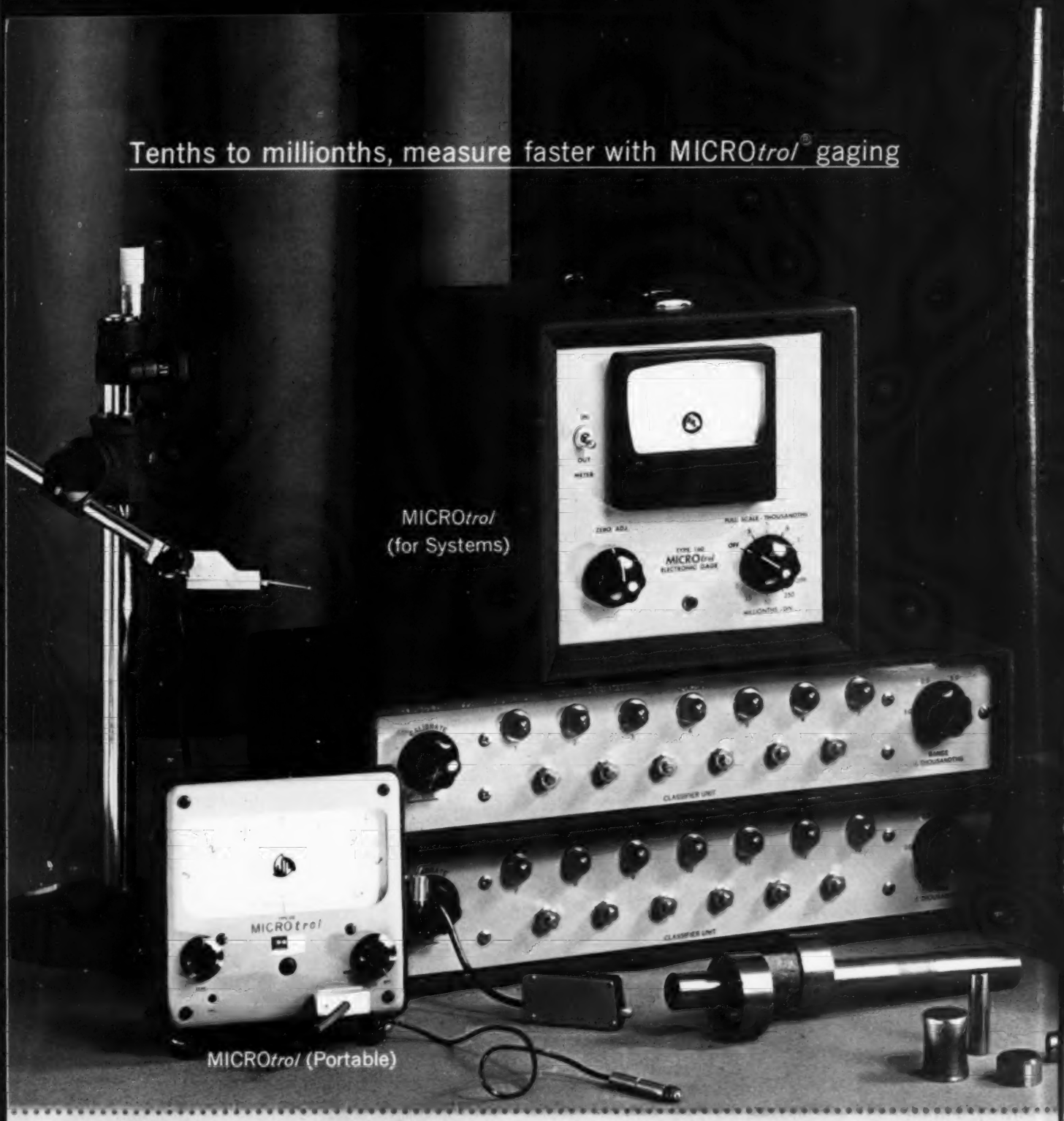

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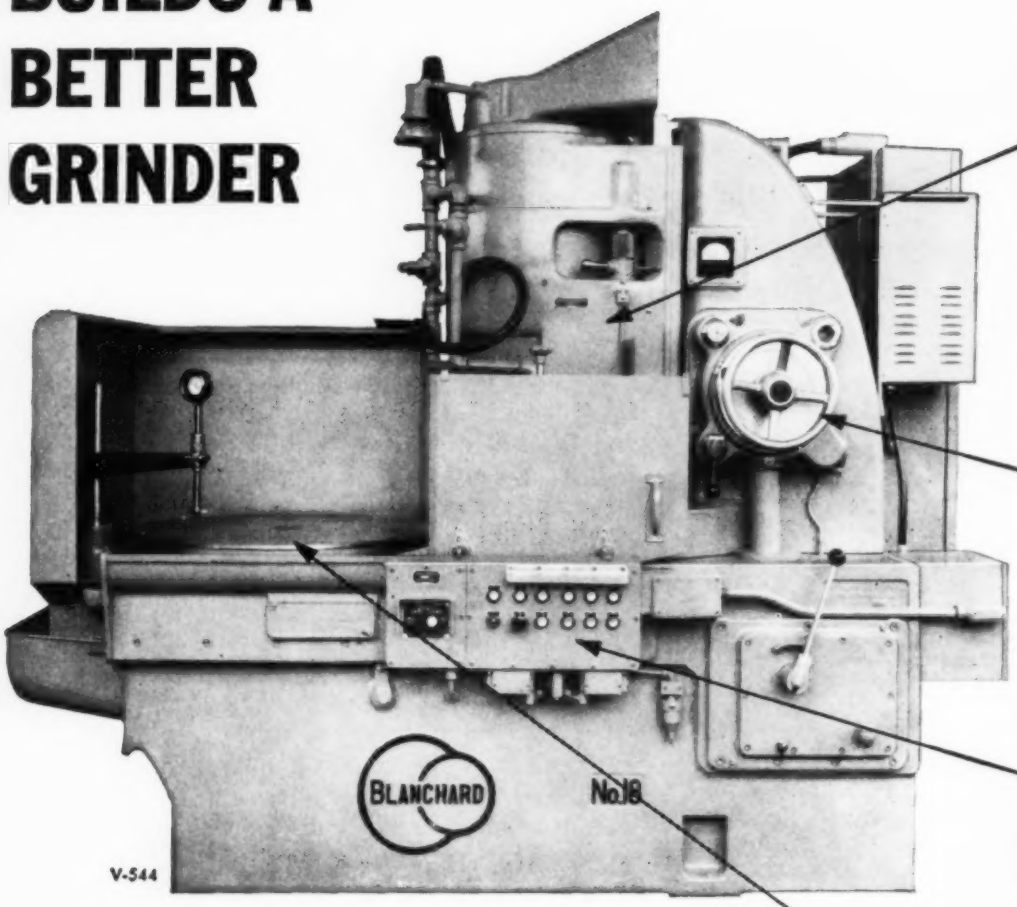

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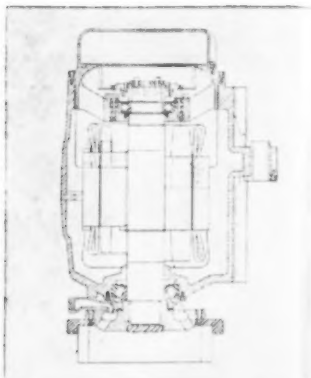

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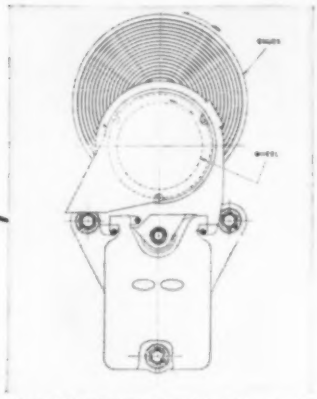
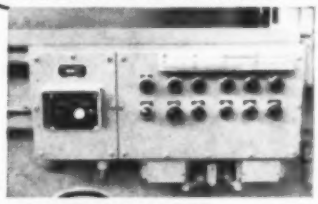


WHEEL HEAD COLUMN . . . is of heavy box-section design for extra rigidity . . . supported at 3 widely-spaced points. Column may be easily adjusted for alignment. Special column tilting devices available to produce concave or convex surfaces.



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GRINDER CONTROL . . . is compact and conveniently located for fatigue-free handling. All control panels are BLANCHARD manufactured for troublefree operation.

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MAGNETIC CHUCK . . . provides maximum useful magnetic surface . . . has such closely spaced poles, that work as small as a quarter will always touch two or more.

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metal working achievements at

ASM METAL SHOW

The 1961 Detroit Metal Show will be held October 23-27. The sponsoring society, The American Society for Metals, and nine participating societies will present a number of technical sessions and awards during the days of the show. Of special interest to GRINDING & FINISHING readers will be a few of the technical sessions and approximately 35 exhibitors.

● Using the theme, "How American Industry Can Meet the Challenge for World Leadership," Allan Ray Putnam, Managing Director ASM, set the attitude of the show by stating, "If we are to increase our lead in this race for space, survival and economic position, it is most imperative that we make substantial reductions in the all-important 'time lag' between development of a new or improved engineering material or process and its actual use in a missile, rocket, space vehicle or conventional weapon . . . or in an automobile, piece of machinery or other highly competitive domestic products."

Some of the more important sessions to abrasive users are as follows:

New Metal Removal Techniques—Wednesday, October 25, 2:00 PM, at Cobo Hall. Included will be presentations on "Electrolytic Metal Removal Processes" and "Ultrasonic Machining."

Space Age Metals I—Thursday, October 26, 9:00 AM.

"Effects of Surface Finish on Properties of Beryllium Sheet."

The following is a list of exhibitors who will display products of interest to those performing abrasive operations:

Acme Manufacturing Co.
Allison-Campbell Div.—American Chain & Cable Co.
American Optical Co.
Ashland Oil & Refining Co.
Bausch & Lomb Inc.
Beaver Pipe Tools, Inc.
Branson Instruments, Inc.
Brinkmann Instruments
Cavitron Equipment Corp.
Collins Microflat Co., Inc.
Curtiss-Wright Corp.
Daystrom, Inc.—Weston Instrument Division
E. I. duPont de Nemours & Co.
Elion Ultrasonics, Inc.
Elox Corp. of Michigan
Engelhard Industries, Inc.

continued

ASM METAL SHOW

continued

Globe Industries—
Vibrodyne Div.
William J. Hacker & Co., Inc.
E. F. Houghton & Co.
Instrument Development
Labs., Inc.
Magnaflux Corp.
Merit Products, Inc.
Metallurgical Products Dept.
Div. of General Electric Co.
Micrometrical Manufacturing
Co.
Minnesota Mining &
Manufacturing Co.
Mobil Oil Co.
Murray-Way Corp.
Oakite Products, Inc.
Olsen Scientific
Instruments, Inc.
Pangborn Corp.
Pyrometer Instrument Co.
Ransohoff Co.
Scherr-Tumico, Inc.
Shaw Instrument Corp.
Southwestern Engineering Co.
Texaco, Inc.
Vapor Blast Mfg. Co.
Wheel Truing Tool Co.
S. S. White Industrial Div.
Wickman Products Corp.
Wiedemann Machine Co.

A number of the exhibitors have indicated what they will be showing which will be of interest.

Acme Manufacturing will be featuring a new low cost abrasive belt finishing machine and a new vertical polishing and buffing machine. The belt finishing machine performs flat grinding, deburring and polishing operations on bars, strips, blanks, stampings, forgings, die castings and sand castings. The polishing and buffing machine simultaneously finishes both sides of flat, angular or irregular shaped parts.

Allison-Campbell will operate dry and wet abrasive cutting machines in actual tests on special and common metals. Their newest wet cutting machine has a capacity to cut solids up to 4″ square, pipe and tubing up to 6⅝″ and channel iron up to 8″.

Metallographic apparatus for new techniques in wet grinding, "DP" polishing, electrolytic lapping and metal microtomy, will be presented by William J. Hacker & Co., Inc.

Giant clear plastic hemisphere will fill to show transparent quality and drain to show wetting speed of the water-soluble chemical cutting fluid by E. F. Houghton & Company. A display in the middle of the dome will illustrate rust preventive qualities of the coolant.

Merit Products promises to introduce a new abrasive device in their booth as well as their present line of flap-type wheels.

Compounds for machining and barrel finishing designed to cut costs and boost quality will be featured at the Oakite Products, Inc. booth.

An additive developed by Wheel Truing Tool Company, to extend the life of their lapping compound, will be introduced at the company's booth. The new surfactant evenly disperses small particles of diamond dust throughout the compound and maintains a high degree of activity among the surface particles. • • •

Special to GRINDING and FINISHING

Abrasive belt grinds plastic film to millionths

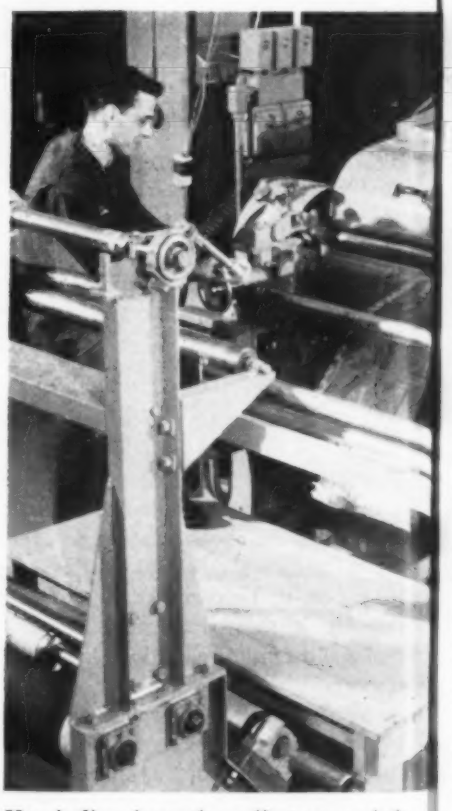
● Want to take 50 millionths of an inch off clear 1-mil Mylar film with a tolerance of ± 10 millionths? This improbable project was accomplished recently in the Product Engineering department of Behr-Manning Co. at Troy, N.Y. Beyond proving the precision of modern coated abrasive machinery, the feat seems to offer doubtful commercial usefulness.

The fun began when a laboratory man inquired whether such film could be buffed to kill the specular reflection.

The request, together with a roll of Mylar film 18 in. wide, arrived in Product Engineering. The film was forthwith fed through a brute of a machine with a 50″ wide abrasive belt used by the tanning industry to buff whole cowhides. Lo, the gloss was gone and the film still measured 0.00137 to 0.00135″ in thickness.

Then some optimist suggested setting the machine to remove "stock." New film was fed through at 27 feet per minute against an oscillating E-weight paper belt with aluminum oxide abrasive bonded by resin over glue. Grit size was 320, belt speed 4000 surface feet per minute. The film came through unrumpled and without a tear. When gauged, it measured between 0.00132 and 0.00130″.

To prove that they could duplicate the stunt, the engineers called in a plant photographer and ground off some more microinches—successfully. • • •



Unwinding from the roll at upper left, plastic film of 1-mil thickness is ground 0.00005″ thinner by a coated abrasive belt.

Diamond Developments in Europe

By PATRICK GREENE,
F. G. A., A. I. INF Sci.
Editor of
Industrial Diamond Review,
London, England*

● Until a few years ago it was generally considered that honing processes using impregnated diamond tools in place of the conventional honing stones could only be applied satisfactorily to metals considerably harder than normal steels. During the past few years, however, a considerable amount of development work, especially by British manufacturers of diamond tools, has caused this view to be changed completely, and at the present moment a wide variety of workpieces made from normal steels is being honed with diamond impregnated stones to the great satisfaction of the users.

Amongst the pioneers in the use of this type of tool is the great Volkswagen factory in West Germany, where experimental honing of cylinder bores with this type of tool started some five years ago. Since then automatic honing machines for the cylinder bores of the entire output of the factory have been installed and fitted with impregnated diamond honing stones made by Impregnated Diamond Products of Gloucester, England. The machines used, manufactured by the German firm of Gehring KG, Stuttgart, have been specially designed for the purpose. Very large improvements in output figures have been claimed by Volkswagen since this change-over, and on some occasions more than 60,000 cylinders have been honed to the requisite degree of precision with a single set of diamond hones. Similar improvements are reported by the Simca concern in France at whose Unic factory near Paris diamond hones are used for the completion of the bores of Diesel engine injection pumps. It is reported that the great Fiat concern in Turin, one of Europe's largest IC engine manufacturers, is also experimenting with diamond honing and is likely to put this process into normal production use quite shortly.

Not only the automobile manufacturers, but a wide range of other engineering industries, from domestic refrigerator makers to aircraft manufacturers, are finding diamond honing the answer to the problem of combining high precision with long production runs in automated factories.

New quarrying system

A machine developed by cooperation between a diamond tool manufacturing company (Diamant Boart of Brussels) and a quarrying machine manufacturer (Wallen of Ecaussines) has resulted in a new method of quarrying the local Belgian blue-stone. This stone occurs in layers approximately 30 to 40 inches in thickness separated by thin layers of friable crystalline material. The old method of quarrying this was to drill a number of holes closely spaced through the layer and break out the blocks by wedging. This entailed a considerable loss of the stone and was a slow and laborious proceeding.

The new machine consists of a set of portable tracks which can be laid down on the quarry floor to carry a 2½ m diameter diamond saw and its associated power and control equipment. The entire machine is traversed along the tracks by rack and pinion system and capable of producing a saw cut of over 1 m depth at a rate of about 20 feet an hour. By producing a series of parallel cuts, spaced out at suitable distances, the blocks of blue-stone can be wedged out from the quartzite layers far more expeditiously than by the old system and are produced with two of their faces smoothly finished by the saw cut. In this way a considerable economy, both of time and material has been achieved, and the smooth faces of the sawn blocks assist considerably in mounting them on the sawing machines which are used for the finishing process. • • •

*This publication reviews all articles published in the world which deal with or refer to the use of industrial diamonds. In the capacity of editor, Patrick Greene is a most informed individual on industrial diamond applications.

An integrated approach

New approach to measuring abrasive efficiency includes study of all factors; stresses softer wheels, and frequent, uniform wheel dressing. Actual abrasive costs in terms of pieces ground per wheel become less significant as direct labor and overhead costs zoom upward.

● Ascending wage rates and their related costs over the past few years have raised doubts about the validity of the traditional pieces-per-wheel measure of performance for grinding wheels. And the questioning has led to what is termed at Carborundum the "systems approach" to abrasive costs. The plan involves consideration of all mechanical and economic aspects of a given grinding operation, and adjustment and control of the variables to enable the customer to turn out an acceptable end-product at least cost.

Technical service to insure proper use of products, of course, is an accepted practice by companies whose output is consumed by other industries. Among most abrasive manufacturers this work has been concentrated on the abrasives themselves, virtually excluding other factors.

However, as Figure 1 illustrates, direct labor costs are increasing rapidly. A reasonable estimate for direct labor rates on grinding operations would be about $2.75 per hour, with overhead or burden at $5.50 per hour. Any measure of the performance of grinding wheels which ignores these two costs is of questionable validity for many grinding operations.

Table A lists approximate abrasive costs per hour for a few typical grinding operations. These relate solely to the rate at which grinding wheels are consumed, and do not include direct labor nor overhead. With abrasive costs per hour ranging from a low of thirteen cents to a high of $350.00, it is obvious that no simple formula nor method can be generally applied to achieve minimum costs. Each operation must be examined on its own merits.

Table A—Approximate Abrasive Costs for Typical Grinding Operations

Grinding Operation	*Abrasive Type*	*Abrasive Cost Per Hour*
Portable	Aluminum Oxide	$ .13 to $ 25.00
Centerless	Aluminum Oxide	$ .17 to $ .48
Crank Pin Grinding	Aluminum Oxide	$ .66
Surfacing of Carbide	Silicon Carbide	$ 1.00 to $ 2.50
Cut-Off (Wet)	Aluminum Oxide	$ 2.50
Cut-Off (Dry)	Aluminum Oxide	$ 4.00 to $ 16.00
Cemented Carbide Tool Grinding	Silicon Carbide	$10.00 to $ 19.00
Cemented Carbide Cutter Grinding (Wet)	Diamond	$20.00 to $330.00
Cemented Carbide Cutter Grinding (Dry)	Diamond	$28.00 to $350.00

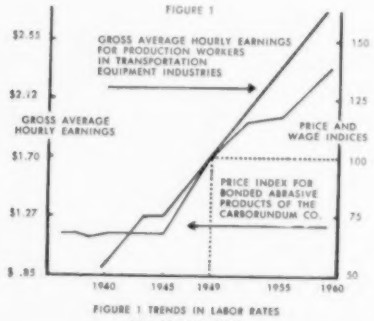


FIGURE 1 TRENDS IN LABOR RATES AND ABRASIVE PRICES

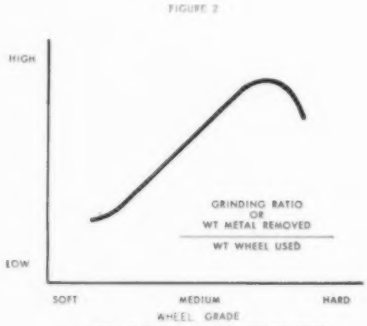


FIGURE 2 GENERAL RELATIONSHIP OF WHEEL HARDNESS TO THE GRINDING RATIO

Applying the Systems Approach

Following is an outline of the systems approach:

1. The customer supplies the dimensions, tolerances, the desired finish of the ground surface and any other pertinent quality characteristics of the end product. He also states the kind of grinding machine available and its operating characteristics.
2. He also supplies sample of parts or blanks. Related information on present and desired production rates is also helpful.
3. The grinding wheel manufacturer conducts laboratory studies to establish optimum grinding conditions. These studies consider, of course, the mechanical aspects of the operation—work feeds and speeds, wheel feeds and speeds, grinding fluids, abrasive types, bond types, wheel hardness, and so forth.

Wheel Grade

Wheel hardness or grade is an important factor in the economics of grinding operations, as is indicated

to grinding costs

By **STANLEY D. MARK, JR.**, Manager, Technical Branch, and
JOHN A. MUELLER, Manager, Testing Department,
Bonded Abrasives Division, The Carborundum Company

in Figure 2. This is a curve showing the general relationship between wheel hardness and the grinding ratio.* Many customers prefer a wheel grading which will give a maximum grinding ratio.

It is known, however, that when softer grade grinding wheels are used, higher production rates can be achieved on many operations at the expense of decreasing the grinding ratio and increasing unit abrasive cost. The systems approach includes investigation of relatively soft grinding wheels, especially if hourly abrasive cost is less or about the same as hourly direct labor and overhead charges. When hourly abrasive cost is several times hourly direct labor and overhead, it may be necessary to secure the highest grinding ratio, even at the expense of decreasing production rates.

Systems Approach and Machine Output

Machine output is directly proportional to the power available to do grinding, as shown in Figure 3. The chart covers a range of wheels from a soft J grade to a relatively hard N. This was a wet cylindrical grinding operation, using vitrified aluminum oxide wheels on A4142 steel. The type of grinding is of no particular significance, and the conclusions are not specific to cylindrical grinding. With a low-powered machine on cut-off operations, for instance, a hard wheel may stall the machine but a softer grade will permit it to operate. Similar conclusions have been observed in toolroom grinding.

It is evident from Figure 3 that higher production rates require more power for all wheel grades. At a given rate, a hard wheel requires more power than a soft wheel. At 0.28 cu. in. per minute, the M wheel requires 60% more power than a J wheel; at 0.56 cu. in. per minute, 77% more; at 1.12 cu. in. per minute, 88% more.

Softer grade wheels permit increased production rates from a given power input. At a level of approximately 1¾ hp (Figure 3), the J grade wheel produced at twice the rate of the K wheel. These differences in production resulting from changes in wheel grade are greater at higher production rates than at lower rates.

Wheel Conditioning

The grinding systems approach emphasizes wheel conditioning (dressing), which has not received the attention it warrants.

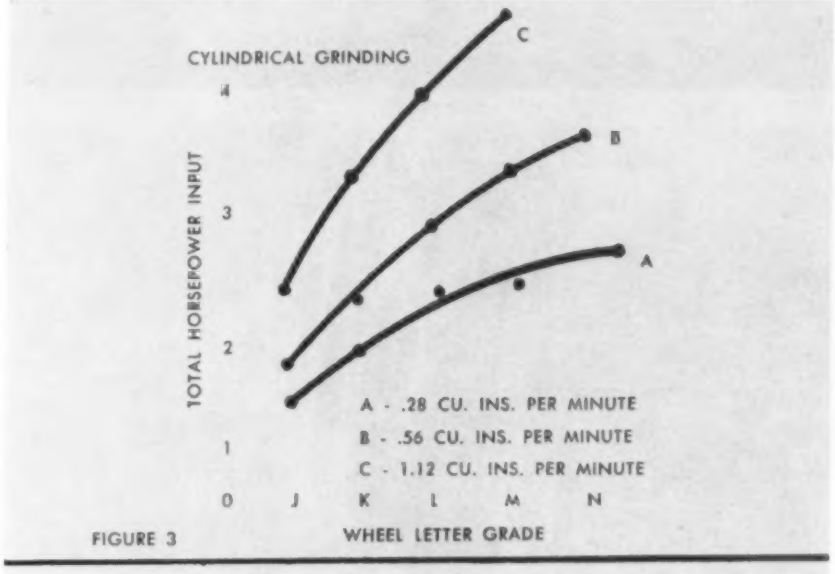


FIGURE 3

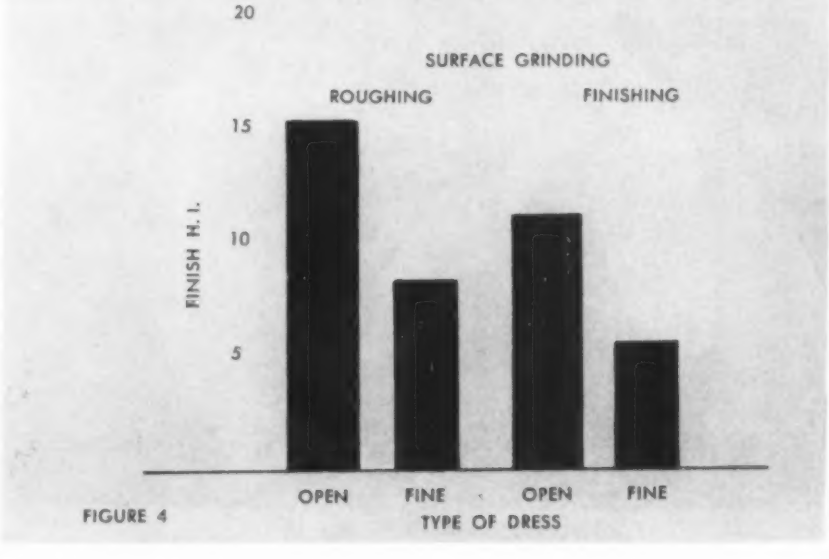


FIGURE 4

*Grinding ratio is the quotient of the weight of metal removed divided by the weight of grinding wheel used. The higher the grinding ratio, other things being equal, the lower is the unit abrasive cost. Volume of metal removed and abrasive consumed is sometimes used in place of weight.

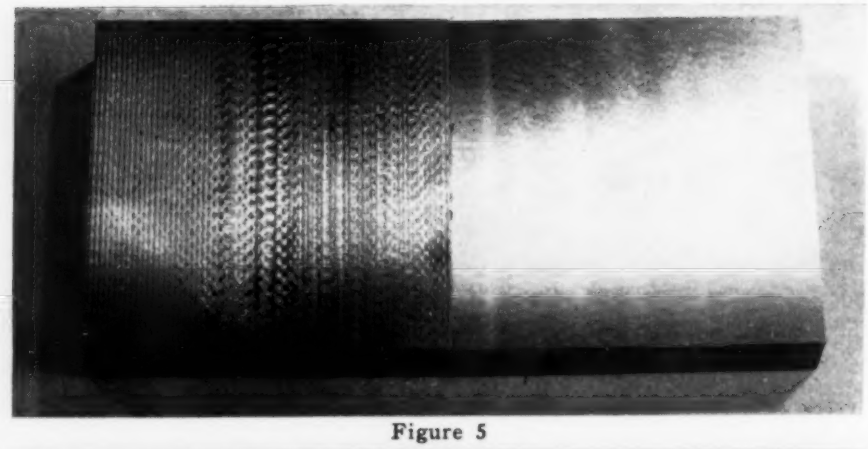


Figure 5

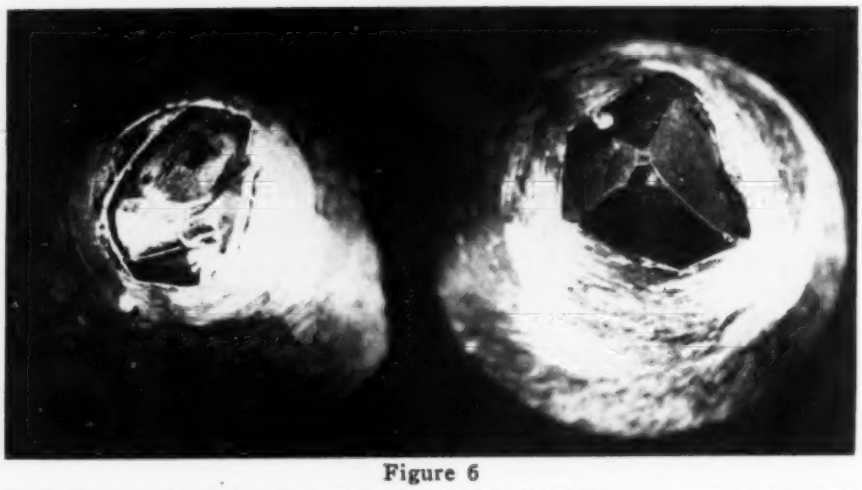


Figure 6

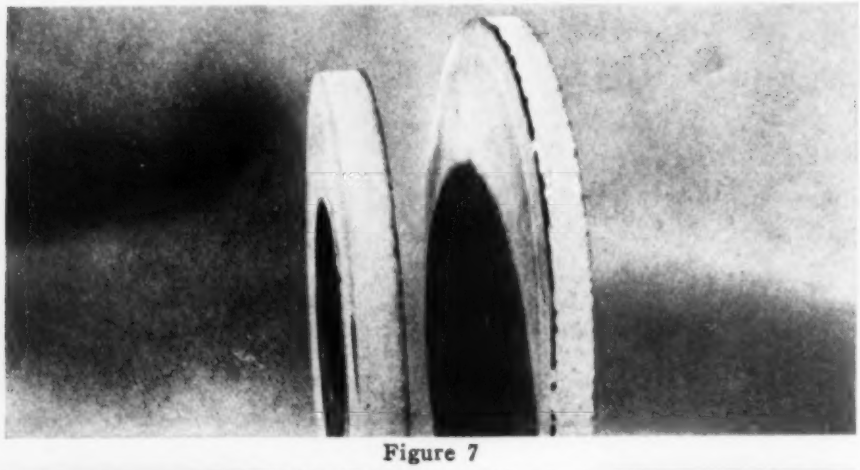


Figure 7

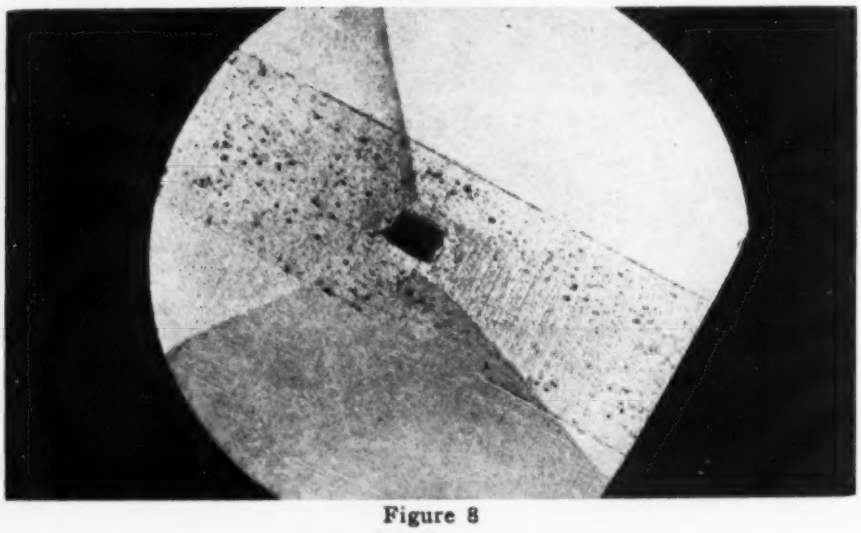


Figure 8

Dressing is done, in the conventional sense, to

1. Restore the cutting face of the wheel by removing dull abrasive and exposing sharp new grain;
2. Remove metallic load;
3. Remove grinding swarf;
4. Deliberately dull the cutting face to produce a desired finish.
5. Restore the face of the wheel to its original shape.

The effect of wheel conditioning on wheel performance is dramatically shown when the grind produced by a fine dressed wheel is compared with the grind of an open dressed wheel (Figure 4). Conditioning the grinding wheel permits various finishes to be produced with the same wheel.

The type of dressing tool also influences the final product. Both of the parts, shown in Figure 5, were ground under identical conditions, except that one wheel was dressed with a dull diamond, the other with a sharp diamond. (Figure 6). Figure 7 shows the difference in load on the two wheels, illustrating why they ground so differently.

Basically, this difference in grind was produced by a change of method in conditioning the wheel. As the diamond became dull, its contact changed from a line contact to an area contact, changing the wheel's performance from good to unsatisfactory.

If a single point diamond could be maintained so that a sharp chisel edge were always available, wheel conditioning and consequently wheel performance would be uniform. In practice, this just doesn't happen.

Under present circumstances, a single point diamond of uniform cross section (Figure 8) appears to be the best suggestion. This provides a constant wheel dressing condition, because the contact area cannot change. This dressing tool holds great promise, because after the dressing cycle is established, it can be repeated time after time without change.

Stress Generation

Control of stress generated in the ground part is another factor in the

Fig. 5. Both surfaces ground with identical wheels, left with dull diamond dressing, right with sharp.
Fig. 6. Dull (left) and sharp (right) diamonds. Note chisel edges and point on sharp tool.
Fig. 7. Wheel dressed with sharp diamond (left) is unloaded; dull diamond (right) allows heavy load.
Fig. 8. Diamond with uniform cross section provides constant dress.

stems approach. Data compiled over a ten-year period by Dr. Harold R. Letner and his associates and reported in GRINDING and FINISHING, TRANSACTIONS of the ASME, and other journals (bibliography on request) produces the following conclusions:

1. Stress produced by grinding does not decrease fatigue strength when good grinding practices are used.
2. Grinding conditions which produce excessive residual tensile stress to the detriment of fatigue strength would be regarded as excessively severe by any good grinder operator.
3. Special grinding techniques can be used to produce a significant increase in the fatigue strength of ground parts through generation of high compressive residual stress.

From Letner's data can be derived some simple rules of grinding practice to produce minimum stress:

1. For minimum stress, use soft grade wheels, light infeeds, faster table speeds, open dressed wheels.
2. If large amounts of stock must be removed with heavy unit feeds, be sure to finish with light infeeds and a freshly dressed wheel.
3. To produce minimum stress, redress the wheel for the finish pass. Sparking out without redressing the wheel does not reduce residual stress.
4. Each pass of the wheel wipes off the effect of the preceding pass. Stress is not cumulative.
5. Specially selected grinding oil can produce high compressive strength, which in turn increases fatigue strength.
6. Stresses produced by grinding can be controlled within limits as to be both type and degree.
7. These methods are within the scope of normal grinding procedure, and can be used by machine designers.
8. Where residual stress, fatigue strength and distortion are important considerations, grinding conditions should be specified by those responsible for product quality, not left to operator's judgment.
9. Abrasive barrel tumbling can replace tensile stresses with compressive stress.
10. Residual stresses can be reduced without affecting the hardness by as simple a procedure as

continued

ABRASIVE COST IN GRINDING OPERATION

LABOR AND OVERHEAD COST PER HOUR-DOLLARS	INCREASE IN PRODUCTION TO MAINTAIN SAME UNIT COST				
	ABRASIVE COST PER HOUR				
	$.664	.99	1.32	1.65	1.98
$ 5.00	8	8.5	8.9	9.4	9.9
7.50	8	8.3	8.6	9.0	9.3
10.00	8	8.2	8.5	8.7	9.0
15.00	8	8.2	8.3	8.5	8.7

TABLE B

ABRASIVE COST IN GRINDING OPERATION

LABOR AND OVERHEAD COST PER HOUR-DOLLARS	PER CENT INCREASE IN PRODUCTION TO MAINTAIN SAME UNIT COST				
	ABRASIVE COST PER HOUR				
	.664	.99	1.32	1.65	1.98
$ 5.00	0	6	11	18	24
7.50	0	4	8	13	16
10.00	0	3	6	9	13
15.00	0	3	4	6	9

TABLE C

	CUSTOMER METHOD	SYSTEMS METHOD
MACHINE	INTERNAL GRINDER	INTERNAL GRINDER
WHEEL SIZE—INCHES	1-1/16 x 1-1/2 x 3/8	1-1/16 x 1-1/2 x 3/8
MATERIAL GROUND	SCREW STOCK RC63	SCREW STOCK RC63
WHEEL SPEED—SFPM	4868	6500
WORK SPEED—SFPM	334	160
GRINDING FLUID	WATER SOLUBLE	WATER SOLUBLE
OPERATION REMOVE .012 INCH TIME—SECONDS	95	60
FINISH—MICROINCHES	40	13
WHEEL SPECIFICATION	80 GRIT M GRADE ALO VIT.	60 GRIT K GRADE ALO VIT.

TABLE D

COST PER POUND OF METAL GROUND PER HOUR	WHEEL SOFTER	GRADING HARDER
METAL REMOVED—POUNDS PER HOUR	47	36
WHEEL COST—DOLLARS	62	62
COST PER POUND OF METAL GROUND PER HOUR	$.081	$.093
WORK UNITS MACHINE HOURS NUMBER OF PARTS		
ABRASIVE COST	.037	.031
POWER COST	.002	.002
TOTAL COST	$.120	$.126

TABLE E

COST PER POUND OF METAL GROUND PER HOUR	WHEEL SOFTER	GRADING HARDER
METAL REMOVED—POUNDS PER HOUR	47	36
WHEEL COST—DOLLARS	86	62
COST PER POUND OF METAL GROUND PER HOUR	$.081	$.093
WORK UNITS MACHINE HOURS NUMBER OF PARTS		
ABRASIVE COST	.043	.031
POWER COST	.002	.002
TOTAL COST	$.126	$.126

TABLE F

immersing the ground part for 90 seconds in a salt bath at 600° F, and then quenching in water at 80° F.

Grinding Costs and the Systems Approach

The grinding systems approach stresses softer, freer cutting wheels and frequent, uniform wheel conditioning, both of which tend to increase abrasive usage. This increase, however, is always more than offset by reduced labor and overhead costs, by increased production, or by all three. Data have been compiled to show the increases in production necessary to pay for the additional abrasives.

Assume that this method is being applied to a pin grinding job. The data show that 1478 can be ground with an aluminum oxide vitrified wheel, at a rate of 8 per hour, and with an hourly abrasive usage amounting to $0.664. Table B shows the increases in production required to maintain the same unit cost with increased amounts of abrasive usage and at varying labor-overhead levels per hour. At $5.00 per hour, if abrasive usage is increased 50%, 8.5 cranks must be ground per hour to maintain a constant unit cost. If abrasive cost is doubled, the production level to maintain unit cost rises to 8.9 cranks per hour. Obviously, as the labor and overhead rate is increased, there is a decrease in the number of additional cranks to be ground to maintain a level unit cost.

Table C shows the same data in percentages.

Another example is an internal grinding job on screw stock hardened to Rc 63. Grinding conditions are shown in Table D.

Analysis indicated that wheel and work speeds were not conducive to optimum grinding performance. Slow speeds cause grinding wheels to break down relatively rapidly. In internal grinding, with comparatively small wheels and large work pieces, this effect is magnified and produces very rapid wheel breakdown.

Fast work speeds cause grinding wheels to break down more rapidly than slower work speeds. A 65 to 1 ratio between wheel and work speeds is a good rule of thumb.

It was suggested that the wheel speed be increased from 4868 sfpm to 6500 sfpm, and work speed reduced from 334 sfpm to 160 sfpm, as close to the 65:1 ratio as could be achieved under the circumstances. As a result, grinding time was reduced from 95 to 60 seconds, and finish was improved from 40 to 13 microinches.

A final example is a snagging operation on steel castings. A hard wheel was being used. A softer acting wheel was suggested, with results as shown in Table E.

Originally, abrasive cost was one-third of the total grinding cost, with labor and overhead making up the other two-thirds. Changing to a softer wheel increased abrasive cost, but lowered labor and overhead. Total grinding costs were decreased by 5%, and productivity was increased.

These changes are shown in another way in Table F. This table shows that the faster cutting abrasive wheel could have cost up to $86.00 instead of $62.00 without increasing the unit cost of grinding.

These data indicate that a grinding systems approach can mean substantial and measurable increases in profit for the user of abrasives. • • •

What is involved in WHEEL SELECTION ?

By ERNEST N. RODGERS • Jowitt & Rodgers Company

Selecting wheel specifications is a major problem in the industry and is often misunderstood. An explanation of the many factors affecting specification recommendations and the reasons for them will guide considerations of the wheel specification problem.

● Machine data, description of work and job standards are the three basic areas from which information can be obtained to determine wheel specifications. The starting point in determining a suitable specification is probably made subconsciously in the abrasive engineer's mind after the initial conversation with the user about the type of metal to be ground. This starting specification is then altered or confirmed as additional information is obtained.

The following are the points of consideration which should be made in selecting wheel specifications for segments and cylinder wheels for vertical spindle surface grinding, but they also apply in most instances to all types of grinding. Broken down into four divisions, each abrasive specification could be separated into: friability of grain, grit size, hardness or grade and structure. (See GRINDING and FINISHING, Feb. - June, 1961) The points of consideration are followed first by the reasoning for the point and its influence on specification. This is then followed by the divisions of the specification which are affected.

For Consideration	Reasoning	Portion of Specification Affected
	MACHINE DATA	
Make of Machine	Rigidity, ruggedness and ability to finish vary between makes. The more rigid the machine, the softer the grade, the better the ability to finish, the coarser the grit can be.	Hardness & Grit Size
Horsepower	Power to drive the grains through the material without stalling the machine. The greater the hp, the harder the grade and tougher the grit can be, and vice versa.	Friability & Hardness
Segment type or cylinder wheel size	The spaces between segments provide clearance for chip removal and coolant coverage. The amount of space varies with different shapes. A cylinder wheel gives constant contact, into which clearance can be created with an open structure. When clearance is in evidence a harder grade can be used.	Hardness & Structure
Coolant	Soluble oil coolants provide better finishes which permit use of a coarser grit but they load the wheel face more than detergent type coolants so the grade must be softer and the structure more open.	Grit Size, Hardness & Structure
Coolant Clean?	Dirty coolant is ineffective and loads the wheel face. The dirtier the coolant, the softer the grade and more open the structure must be.	Hardness & Structure

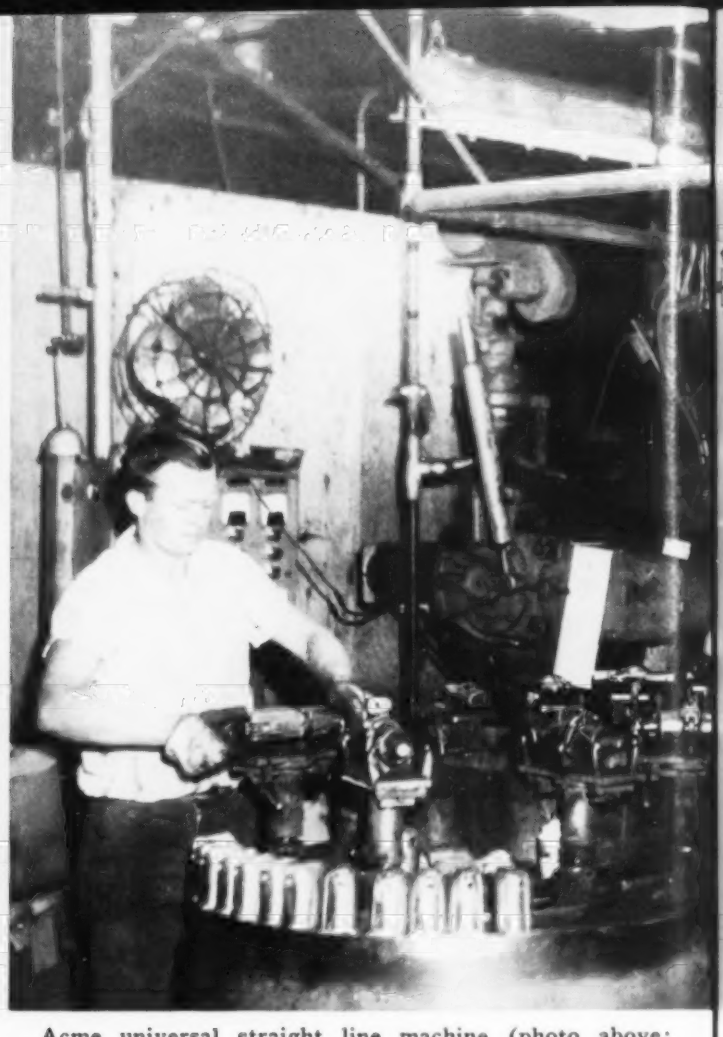
continued

WHEEL SELECTION *continued*

For Consideration	Reasoning	Portion of Specification Affected
Table Size	Diameter of table indicates the areas of work likely to be ground and the surface-feet-per-minute speed at which the work can pass under the wheel. The larger the table the softer the grade should usually be.	Hardness
Amount Head Tilted	On a vertical spindle grinder, a flat head produces full wheel contact on the work, whereas tilting the head reduces the amount of wheel contact permitting use of a harder grade and a denser structure.	Hardness & Structure
Spindle Speed	If faster than usual, a softer grade is necessary.	Hardness
SFPM (Surface Feet Per Minute)	In conjunction with spindle speed, if faster than usual, a softer grade is necessary. When a larger diameter grinding head is mounted on an old grinder, the sfpm is substantially increased and a softer grade is needed.	Hardness
Reason for Trial	May indicate how the present specification may be increased.	ALL
Accuracy of Machine	Reflects work requirements, condition of machine and the ability of the operator.	Friability, Grit Size & Hardness
Ground Table?	If "Yes," it reflects good accuracy of the machine and diligence of the operator.	Friability, Grit Size & Hardness
Variety & Ratio of all work to be ground with this spec.	If this specification is expected to grind other materials than are specifically tried here, a description of other types may alter the choice to encompass this variety.	ALL
	DESCRIPTION OF WORK	
Name of Part	Stated in terms of the particular shop for proper identification.	———
Description (Show Sketch)	Dimensions and shape with holes or other areas of relief such as undercuts, indicate the area presented to the wheel. The larger the area, the more friable, the softer, the coarser, and more open in structure the wheel must be.	ALL
Material & Hardness	Specification of metal and its Rockwell or Brinell hardness can vary considerably within general classification of metal types. The harder the metal the more friable, softer, and finer the specification must be.	Friability, Grit Size, & Hardness
Tolerances Allowed	Indicates the size variation and taper permissible, also care necessary to complete the job. The wider the tolerances are, the tougher the grain, coarser the grit, and harder the grade can be.	Friability, Grit Size, & Hardness
Finish Required	Finish is affected by both grit size and hardness. A soft wheel in the correct grit size will produce as rough a finish as a wheel several grit sizes coarser.	Grit Size, & Hardness

For Consideration	Reasoning	Portion of Specification Affected
Estimated Stock Removal	The more stock to be ground off, the faster the downfeed will probably be applied, permitting use of a tougher grain and harder grade because the increased downfeed will tend to break down the wheel. Also the more open the structure should be to provide maximum chip clearance.	Friability Hardness & Structure
Pieces Per Load	Reflects the area of work presented to the wheel. The larger the area the more friable, softer, coarser, and more open the wheel must be.	ALL
Table Arrangement	If the pieces are ganged together at one spot on the table, especially if in the center, a softer, more open, wheel would be required than if they were separated in small groups in a chord-like fashion at the outer edge of the table. A spoke-like arrangement gives the most space between pieces allowing use of an even harder grade.	Hardness, & Structure
Total Area Presented	Again reflects area of work presented to the wheel in over-all terms such as broad, medium, or rim contact.	ALL
	JOB STANDARDS	
Rate of Feed	If abnormally high, the grit should be tougher, the grade harder and the structure more open, and vice versa. An increased rate, provided the breakdown ratio is favorable, means that metal is being removed faster.	Friability, Hardness & Structure
Table Speed	A loose rule of thumb is that the faster the table speed, the softer a wheel acts; slower the table speed, the harder a wheel acts. Slower table speeds are sometimes used for finish grinding, because of the harder action of the wheel.	Hardness,
Maximum Amps Drawn	Amperes indicate resistance between abrasive and the work piece. Low amps generally indicate a wheel that is too soft for the job and excessive amps indicate that it is too hard. All other factors remaining constant the amps permit direct comparison between wheels of different hardnesses. Usually the ideal amp reading should be wavering from 20% below the maximum reading up to 10% below maximum reading and back again. This would indicate that the wheel is breaking down on its own, grinding free and cool with each abrasive grain doing its complete job before being torn out of the wheel face, thus providing maximum wheel life.	Friability & Hardness
Number of Dressings Required & Reason	Dressing artificially breaks down the wheel when it refuses to break down on its own. It is done while grinding by swinging the star shaped dresser under the wheel. An ideal grinding wheel specification requires no dressing artificially; it dresses itself. We always hope to eliminate dressing completely on each job. However, when one wheel spec. must cover a variety of jobs it may be necessary on the tough jobs.	Friability, Hardness, & Structure
Total Downfeed Total Stock Removal Ratio: Abr. Wear to Stock Rem. Ratio in Cubic Inches	On these points, a direct comparison can be drawn between specifications. These points all contribute to the measure of wheel life which is a very important consideration for the customer.	_____
Grinding Time	Speed of grinding is governed by the rate of downfeed and the wear ratio and is also a very important consideration.	_____
Finish	Of prime consideration on some jobs, less important on others.	_____

One of a pair of semi-automatic machines used by Diehl for the cut buff operation and for coloring.



Acme universal straight line machine (photo above; diagram upper right) for buffing electric motor parts.

AUTOMATED FINISHING LINES
reduce costs, increase production

● Automated finishing machines recently installed by the Diehl Manufacturing Company at its Pickens, S. C., plant have reduced finishing operation costs and increased production finishing operations on die cast aluminum parts for portable electric tools.

Diehl's automated finishing lines consist of two semi-automatic machines, a 32-foot universal straight line machine, and a 66-inch rotary machine. All were designed and built by the Acme Manufacturing Co., Detroit, Mich.

Before changing over its finishing lines, Diehl performed some of the operation by hand, purchased component parts already finished, and jobbed out parts for finishing.

Electric tool parts—motor housings, gear housings, handle assemblies, and similar components—are both buffed and colored on the new automated equipment.

Semi-Automatic Buffing Machines (two)

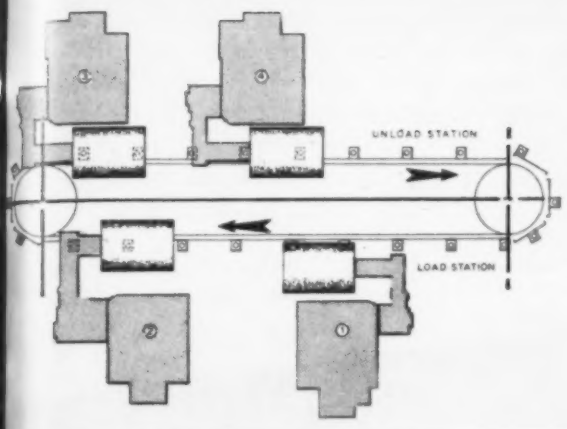
Function: One unit performs cut buff process, the other the coloring operation.

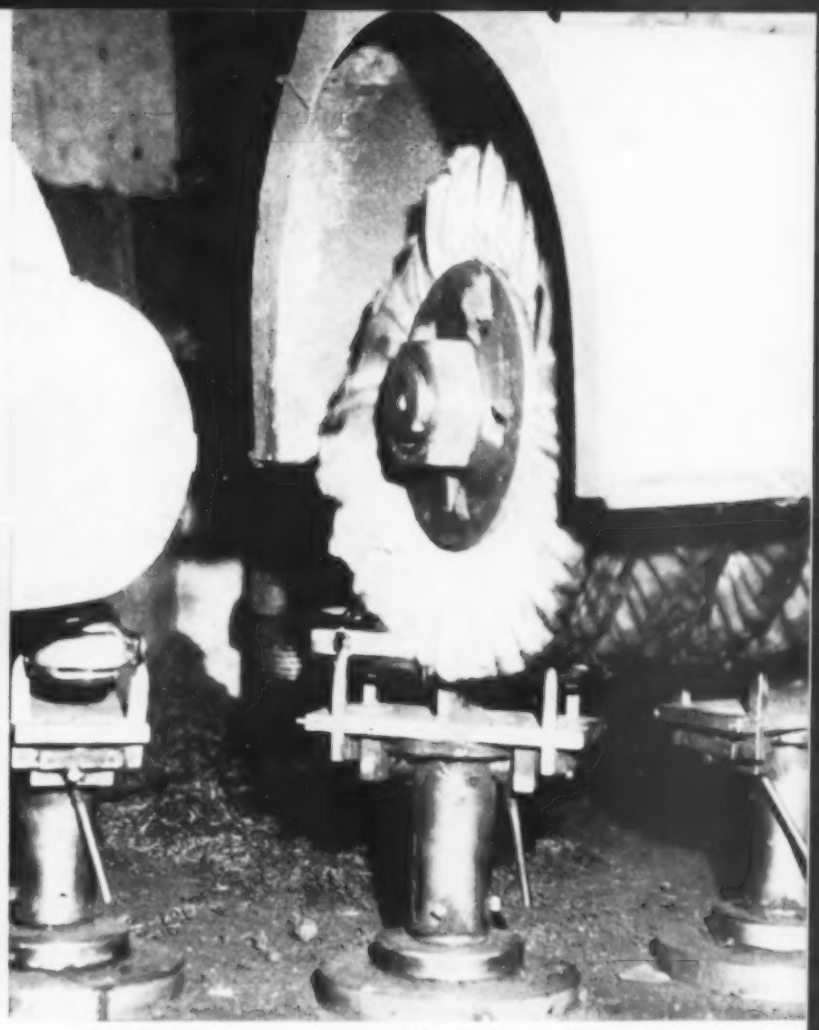
Operation: Machines are two spindle manual indexing types used in conjunction with Acme G-1 lathes. Parts mounted on fixtures on machine spindles (see photo upper left).

Spindles are cam controlled and oscillate by means of rocker arm mechanism to permit out-of-round finishing of electrical tool components. A cam, designed to follow same contour as part to be finished and mounted on machines' work holding fixtures, contacts a guide wheel and controls spindle movement to permit uniform contact between buffing head and the part.

As part on one spindle is rotated in contact with the buffing wheel, another part is being loaded on the stationary spindle. At end of predetermined cycle, buffed part automatically removed from contact with buffing wheel by timer-controlled air cylinder.

Finished buffed part is placed on load spindle of second semi-automatic machine for coloring. Operation exactly same as other machine except that part is rotated with wheel as





Continuous rotary machine (photo above, diagram lower left) with lathes occupies about a 10' x 10' area.

Both output and profit are the results of the Diehl Manufacturing Company's decision to automate its finishing operations.

coloring operation is performed.

32-foot Universal Straight Line Machine

Function: Cutting only.

Operation: Machine consists of an inline conveyor continuously moving platens around the periphery of the machine. Work spindle assemblies attached to each platen with dovetail mountings. Parts mounted on fixtures on work spindles are rotated as they travel through buffing station (center photo and sketch).

Buffing operations performed by four separate adjustable modified Acme G-4 lathes, each equipped with interchangeable power drives that automatically raise and lower buffing wheels in pre-set cycles and feed amounts for wheel wear compensation.

After parts pass through the four buffing stations they are turned over and make a second pass through machine. After second cycle, parts are unloaded manually.

66-inch Continuous Rotary Machine

Function: Coloring buffed parts on the straight line machine.

Operation: Machine is positioned adjacent to the straight line machine. Parts buffed on the straight line are colored on the continuous rotary unit which consists of a series of spindles mounted on a rotary table (sketch center and photo right, above).

Continuous table drive and spindle drive can be varied to meet specific finishing requirements. Coloring operations performed on 4 heavy duty Acme G-4 adjustable lathes placed around the periphery of the rotary table (Figure 4 and 5). Lathes equipped with automatic interchangeable power drive units for raising and lowering and in and out positioning of the wheel heads and for automatic wheel wear compensation.

Part coloring operation is similar to the cutting operation on straight line machine in that two parts are loaded on each fixture, make one pass, are turned over, and make a second pass to finish both sides of the parts. • • •

Special to GRINDING and FINISHING

Metal abrasive selection in blasting saves 55%

Accurate records, analysis of exhaust grit provide proof of savings through metal abrasive selection.

Blast cleaning of machined ring gears, drive pinions and differential "spiders" is done principally to remove traces of scale and heat treat smut developed in the hardening process. Also, a clean surface is far easier to inspect.

As each 50 lb. carton of abrasive is added to the machine, it is logged in by the operator. Calculated against wheel-hour time, Eaton can arrive at a positive measure of cleaning effectiveness: abrasive consumed per wheel hour.

"We've been a highly competitive business long enough that when we have a chance to cut costs on any operation by 55%, we sit up and take notice."

So says Milton R. Koehn, assistant chief metallurgist for Eaton Manufacturing Company's Cleveland-based axle division. Eaton is the world's largest and best-known producer of truck axles and axle assemblies.

Cost Reduction in Cleaning

The dramatic 55% cost reduction came about in the blast cleaning operation, where such parts as ring gears, drive pinions, clutch plates and differential "spiders" are grit blasted after heat treating.

Abrasive cleaning is done to remove slight discoloration, traces of scale and heat treat smut which naturally develop in the hardening process. The operation also has a deburring action, keeping highly abrasive loose metal particles out of the finished axles.

"Also important," Koehn reports, "is product appearance. Ordinarily the parts are not exposed, but a clean blasted surface is far simpler to inspect."

Cleaning Significant Cost

Though the blast cleaning operation represents a small part of the total cost of producing a finished truck axle, it is a significant cost item in view of the total volume: an average of 1000 axles every working day.

The secret of keeping cleaning costs in line, if such a secret exists, is in accurate record-keeping in the blast cleaning department, according to Eaton's production and purchasing men. They have installed a simple but effective method of tracking and charting costs.

The system calls for the installation of a simple time meter on the motor that drives the cleaning equipment. The meter records the number of hours the equipment is in actual operation.

Measure Is Grit Consumption per Wheel Hour

As new 50 lb. cartons of abrasive are added to the system, they are logged in by the operator. One calculation at the end of any given time period provides a positive measure: pounds of abrasive per wheel hour. (Pounds of metal abrasive per impeller or wheel which provides force of abrasive.)

Proof of the system's effectiveness in giving Eaton a well-charted course toward selecting the most effective and efficient abrasive for the job is a 55% slash in abrasive consumption since installation of the meter in 1958. Consumption at that time was averaging 63 lbs. of grit per wheel hour. Material used was a chilled iron with relatively high phosphorus content.

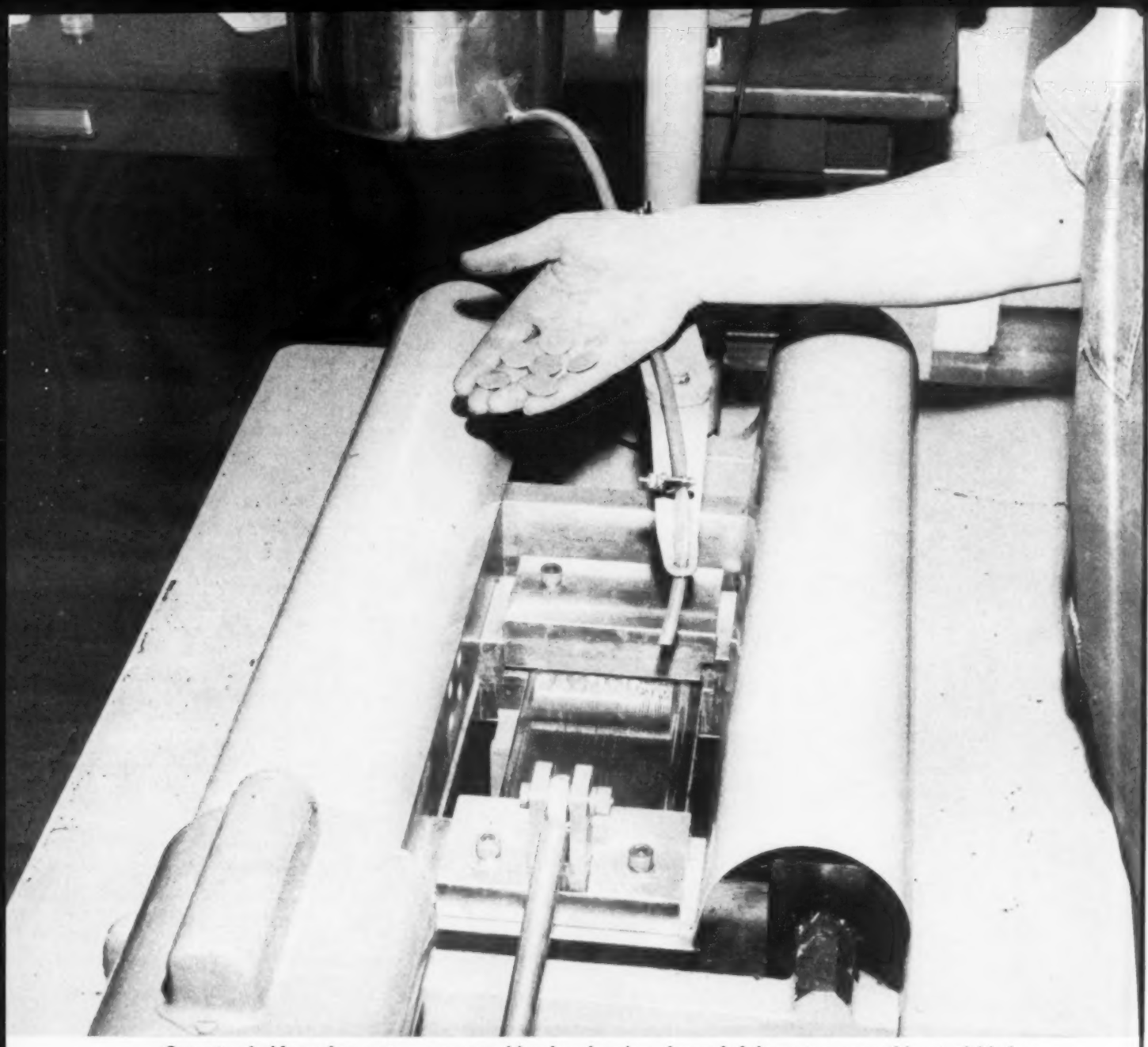
Today, consumption hovers around the 24 lbs. per wheel hour mark for all five blast cleaning machines. The abrasive in use is a controlled toughness chilled iron grit with less than 0.02% phosphorus.

According to T. T. Habzda, buyer for the axle division, "We can test abrasives for as little as twenty working days and know exactly where we stand without any upset in operations. We get an excellent maintenance yardstick, plus full freedom in selecting abrasives and time cycles."

Regular Grit Analysis

An important part of Eaton's operation is regular analysis of grit exhausted from the machine. At regular intervals, the sales engineer from Hickman-Williams, agents for National Metal Abrasive Company, the abrasive supplier, picks up exhaust and operating mix samples and takes them to a local laboratory for evaluation, both by chemical content and by size.

"This regular inspection," Habzda reports, "gives us a constant check on our cleaning equipment and our exhaust practices, all of which help keep our cleaning costs in line." • • •



Operator holds wafers cut on new machine by abrasive slurry fed from top over thin steel blades.

Don't cut away valuable material

New wafering machine designed for cutting crystals of hard, high value material, reduces the loss of material in the use of narrow blades, .008″ or less.

● A new multi-blade wafering machine built by Norton Company, utilizes blades which are .008″ or less thick in cutting wafers flat and parallel within .0005″. Capacity of this machine is adequate for 6″ long by 2″ diameter crystals.

Subsequent lapping operations can often be eliminated due to the fine abrasives used in this process. These grit sizes range from 400 to 500.

Approximately 300 wafers .010″ thick can be cut from a crystal 1″ in diameter. A series of very thin steel blades, precisely spaced, cut the ingot or crystal with reciprocating motion. A slurry of the fine grit silicon carbide is applied either by the operator or automatically to the ingot during the motion of the blades. This abrasive slurry acts as the cutting medium and produces finishes equal or close to final requirements. An operator can attend several machines.

The work is mounted on a pivoting work mount at the end of the feed system. Feeding the work is accomplished by weights at the end of the arm, thus providing a certain amount of give. Blades are precisely mounted in the head under tension by means of a single blade-tension bolt. Reciprocation of the head on hand scraped vee and flat ways is provided by a ¼ hp motor. • • •

3M Abrasives Cut Costs of Steel Utensil Finishing

Nationally famous, "Ekcoware" cooking utensils are manufactured here in the housewares division of Ekco Products, Inc., Massillon, Ohio. Prior to color buffing, these copper-clad stainless steel pans are given a final polishing.

Abrasives Ekco formerly used for this final finishing required a considerable amount of "break-in" time and caused many pan rejects.

Now, thanks to a 3M Representative's suggestion, Ekco has switched to 3M "PG" Wheels. The results have been remarkable. "PG" wheels have upped production 20%, eliminated one handling operation, reduced rejects, and produced a better finish on the pans. There's no "break-in" period either, as 3M "PG" Wheels maintain an even cut from installation to throw-away point.

Why not let 3M's new COST CHECK 5-4-5 Program help you to effectively investigate ways to lower costs and increase production. Discover:

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- If your finishing is as efficient as possible
- If your polishing can be done faster and better

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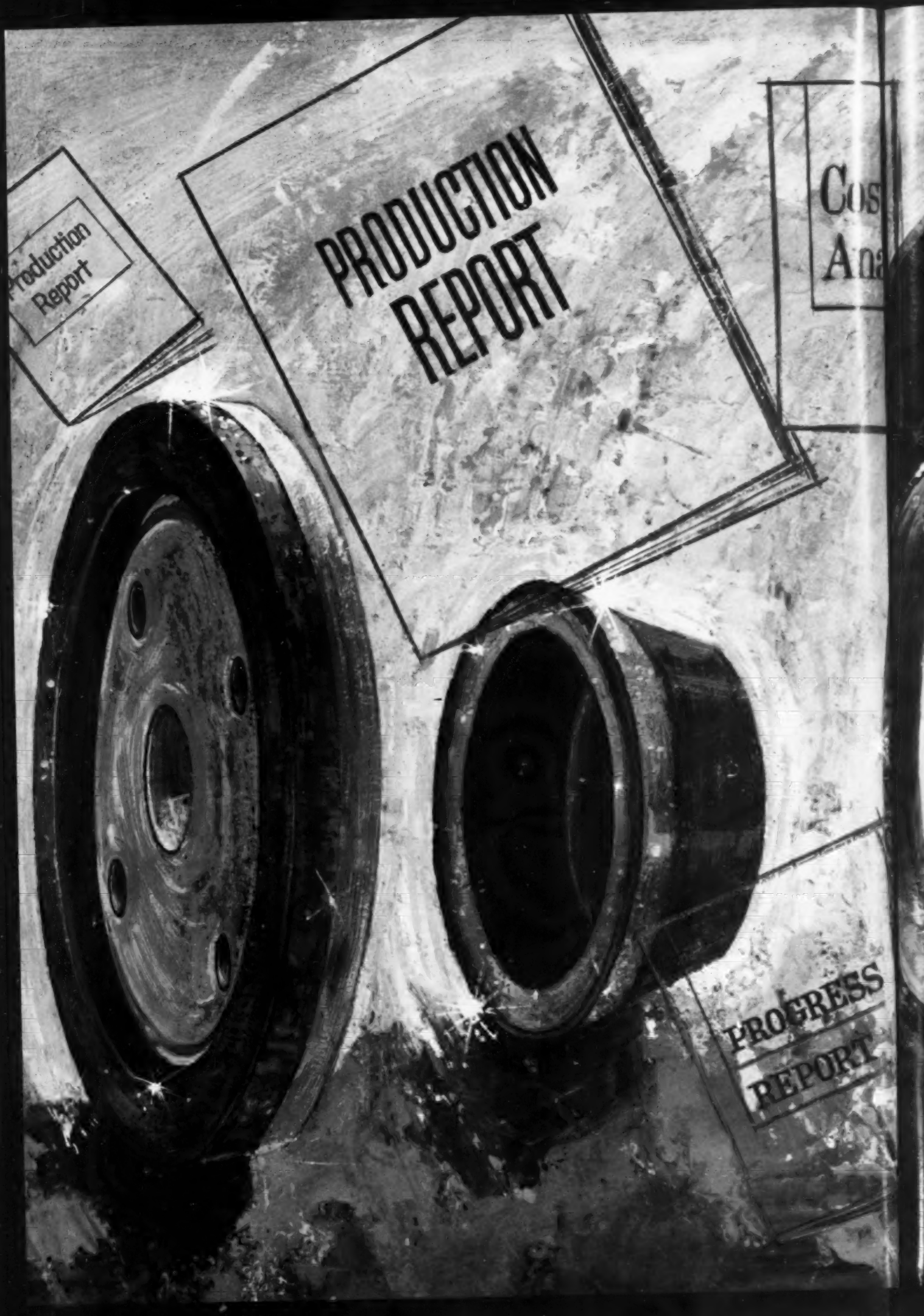
Production Report
PRODUCTION REPORT
PROGRESS REPORT

G-E Man-Made Diamond's contribution to industry

In the few brief years since its introduction, General Electric Man-Made diamond has made important contributions to industry. Specifically, grinding wheel users receive these benefits when they choose wheels containing G-E Man-Made diamond:

Superior grinding performance with General Electric Man-Made diamond over mined diamond has been borne out time and time again. This adds up to one thing: More output per wheel when it contains G-E Man-Made diamond. That's like money in the bank!

Special crystals for all three bonds let you meet your grinding requirements exactly. Resinoid, vitrified, or metal—General Electric makes diamond perfectly suited for these bond types.

Consistent performance is assured by the uniform shape and structure of General Electric Man-Made diamond crystals produced by controlled manufacturing processes.

More to come. Just as General Electric has continually improved the characteristics of Man-Made diamond since its introduction, the future promises bright new things in diamond development. The perfection of special crystals for saws, drill bits, tools, wear parts and specialized abrasives may be a few of the things you can expect during the coming years.

Want to obtain the maximum output per diamond grinding wheel? Then follow the ever-increasing number of wheel users who are specifying G-E Man-Made diamond in the wheels they are ordering from their suppliers.

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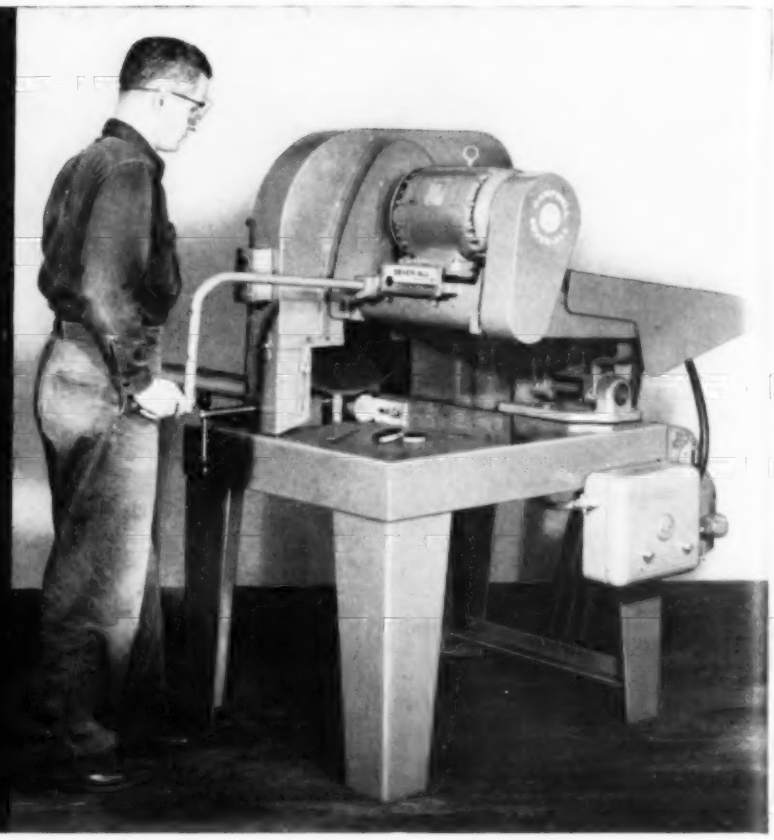


• This newest addition to the Sever-All line of abrasive cutting machines—the Model 2-A—provides greater cutting capacity and more flexibility than any other machine in its class. Check these important advantages:

Big capacity • cuts 4″ round or square solids, 6″ diameter tubing or standard pipe, 6″ x 1″ flat stock, 6″ angle iron and 8″ channels. Cuts practically all metals.

Fast operation • accurate cuts at the rate of 2 to 3 seconds per square inch. For instance, you can cut a 4″ bar of hardened steel in 45 seconds, or a 2″ pipe in 3 seconds.

Power oscillation • oscillation—the forward and backward motion of the cutting wheel as it is fed down into the cut—gives you extra cutting capacity without excessive horsepower load on your power lines. It also contributes to longer wheel life and reduced operator fatigue.

Quality cuts • clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting action.

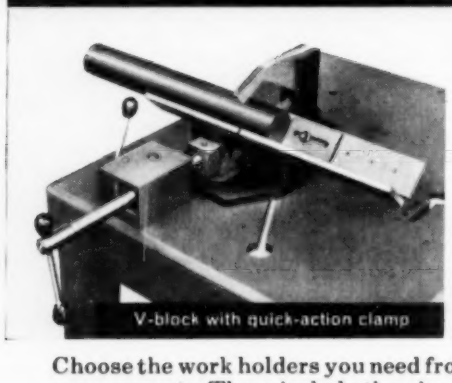
Economy • Sever-All abrasive cutting wheels, developed specially for the Model 2-A, assure you of lowest cost per cut.

Safe • wheel guard provides complete operator protection.

Minimum maintenance • all bearings are the pre-lubricated and sealed type. Clean, simple machine design permits easy housekeeping.

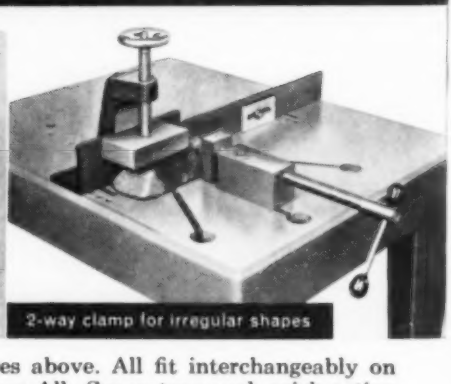
Built to last • rugged machine bed and rigid castings make the Model 2-A first choice for heavy-duty jobs.

VARIETY OF WORK HOLDERS GIVES UNUSUAL VERSATILITY



V-block with quick-action clamp

Angle-cutting work holder



2-way clamp for irregular shapes

Choose the work holders you need from several optional arrangements. These include the vise-type holder shown on the machine at top, plus the V-block, angle-cutting and 2-way clamp fixtures above. All fit interchangeably on the Model 2-A Sever-All. Screw-type and quick-action clamping also may be used interchangeably.

***Write for details** on the new Model 2-A Sever-All abrasive cutting machine. Ask for Bulletin DH-299*

ACCO

SEVER-ALL ABRASIVE CUTTING MACHINES

Allison-Campbell Division, American Chain & Cable Company, Inc.

926 Connecticut Avenue, Bridgeport 2, Conn.

Use postpaid card. Circle No. 239

Literature

Informative reading in abrasive operations for management, engineering, production.

Chemical Emulsion, Water Base Cutting Fluid

Use postpaid card. Circle No. 1

Brochure entitled "New Five-Star Cimcool" (PC-375) describes new chemical emulsion water base cutting fluid which gives trouble free performance. Cincinnati Milling Machine Company, Cincinnati 9, O.

Precision Finishing

Use postpaid card. Circle No. 2

Precision finishing of complex high quality components in a high velocity abrasive stream of media by Almco spindle machines is featured in an 8-page bulletin. Spindles are independently adjustable, can operate in continuous "in-line" production. Almco Queen Products Division, King-Seeley Corporation, Albert Lea, Minnesota.

Mine and Rock Bit Grinding

Use postpaid card. Circle No. 3

Reconditioning of carbide bits for mine and rock bits is the subject of Electro Bulletin B-661, a two-page flier. Specification suggestions are tabulated, and Do's and Don'ts are listed. Electro Refractories & Abrasive Corporation, 344 Delaware Ave., Buffalo 2, New York.

"Diamond Data": Vol. II, No. 1

Use postpaid card. Circle No. 4

The availability of several types of diamond grit has called for new evaluations in terms of higher levels of performance that can be expected from the use of diamond grit most appropriate for each application. "Diamond Grit Performance: Some New Evaluation Results." Technical Service Dept., Industrial Diamond Division, Engelhard Hanovia, Inc., 113 Astor St., Newark 2, New Jersey.

Resin Fibre Discs

Use postpaid card. Circle No. 5

Resin fibre discs for grinding and rough finishing of all types of metals and metal alloys, bonded with Armourclad adhesive, are the subject of two-page, two-color brochure. Armour Alliance Industries, Alliance, Ohio.

Portable Photoelectric Tachometer

Use postpaid card. Circle No. 6

Fast, accurate speed measurement of both rotating and reciprocating machinery discussed in colorful flier. Dayton Safety Tach, designed for checking grinding wheel speed, has added uses. Dayton Safety Grinding Wheel Division, Simonds Worden White Company, 1101 Negley Place, Dayton 7, Ohio.

Buffing and Polishing Manual

Use postpaid card. Circle No. 7

Technical manual of 20 pages covers manual or semi-automatic polishing, burring, satin finishing, buffing and high coloring of metals and plastics. Data include finish selection, finish appearance and characteristics, and related production factors. The Lea Manufacturing Company, 16 Cherry Avenue, Waterbury 20, Connecticut.

Grinding Wheels

Use postpaid card. Circle No. 8

First comprehensive catalog from Kasco describes their complete line of aluminum oxide and silicon carbide grinding wheels. Disc and cup wheels are featured. Kasco, 3461 East 26th Street, Los Angeles, California.

Precision Chucks

Use postpaid card. Circle No. 9

Catalog No. 61 is the first major revision of the Buck Tool chuck listings since 1957. New items in this 24-page issue include patented gibbed keyway aluminum body power chucks to 18", jaw turning fixtures, and air cylinders. Buck Tool Company, Catalog Dept., 2015 Schippers Lane, Kalamazoo, Mich.

Precision Gage Products

Use postpaid card. Circle No. 10

Reliant Gages, Inc., new Boice subsidiary, has brought out an 8-page, 2-color brochure about its complete line of ring and plug type thread gages and other gages fabricated by the company's new Raco chrome plating process. Reliant Gages, Inc., 2614 Industrial Way, Santa Maria, California.

Wide Abrasive Belts

Use postpaid card. Circle No. 11

"Wide Belt Finishing," a new folder by Carborundum, recites case study results where use of wide belts and wide belt machines for metal working cuts costs and expedites production while maintaining quality. The Carborundum Company, P.O. Box 337, Niagara Falls, New York.

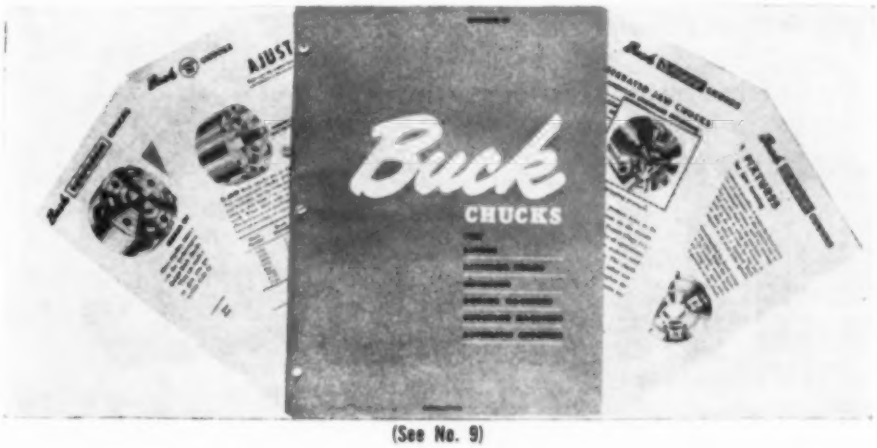
Electrolytic Cutter and Tool Grinder

Use postpaid card. Circle No. 12

Four-page folder explains and describes a Covel cutter and tool grinder designed to use an Anocut electrolytic power pack. Bulletin 121B. Covel Manufacturing Company, Benton Harbor, Michigan.

continued

(See No. 2)



(See No. 9)

CULPRIT?

Here it is, the mighty 42" AA1 Chuck — armed with razor-sharp FM segments — guilty of slashing costs, beating competition, and shattering production records in major plants throughout the country. Go get it! Big rewards!

MODUS OPERANDI: Gets self invited into factory. Proceeds to remove stock at tremendous rate (but real cool), throwing off chips and grinding residue as it goes. Slashes grinding time and abrasive costs up to 50%.

DESCRIPTION: *Size:* 42" dia. (can be found with smaller and larger accomplices. *Build: really* built! *Distinguishing Characteristics:* echelon segment arrangement and unique segment design (among many reasons for its reputation). A quick-change artist. *Scars:* none. *Tattoo:* fm, center each segment.

AREA OF OPERATIONS: Progressive, cost-conscious plants everywhere.

HANGOUT: See below

For a complete stoolpigeon's report, write today!

AA1 Chucks may be used with practically any surface or face grinder.

FM

LITERATURE ON REQUEST.

THE **FULLER MERRIAM COMPANY** 72 Water St. West Haven, Conn. Telephone WEst 3-2501

A GUIDE TO GRINDING WHEEL SELECTION is available on request.

Use postpaid card. Circle No. 240

LITERATURE continued

Hand Feed Surface Grinder

Use postpaid card. Circle No. 13

An 8-page catalog describes and illustrates the Landis 6" x 18" hand feed surface grinder. Contains full descriptions of design features, and discusses the machine's various applications. Landis Tool Co., Waynesboro, Pennsylvania.

(See No. 13)

Rubber Deflashing Process

Use postpaid card. Circle No. 14

A mechanical rubber deflashing process is discussed in detail in the new bulletin "Wheelabrator Rubber Deflashing." A complete description of the deflasher and its operation sequence are provided. In addition, a major portion of the bulletin is devoted to a pictorial description of the various types of moldings for which mechanical deflashing provides the greatest cost savings. Wheelabrator Corp., 1169 S. Byrkit St., Mishawaka, Ind.

Optical Form Grinder Projector-Comparator

Use postpaid card. Circle No. 15

Portman Model OFG-300 optical form grinder projector-comparator designed to fit on most 6 x 18 and 8 x 24 precision surface grinders is discussed. Portman Instrument Company, 1997 Palmer Avenue, Larchmont, New York.

Rust Control Guide

Use postpaid card. Circle No. 16

An 8-page guide to controlling rust during production operations has been incorporated into a rust control data file offered by Magnus Chemical Co. The guide details the known and little-known causes of rust, the six factors vital to successful rust control, and the many specialized rust prevention products which are available. Magnus Chemical Co., Inc., M-88-7 South Ave., Garwood, New Jersey.

Machine Tools

Use postpaid card. Circle No. 17

A 20-page catalog presents, in condensed form, specifications and illustrations of the entire line of Brown & Sharpe machine tools, including milling and grinding machines, automatic and hand screw machines, and turret drilling machines. Optional accessory equipment and other products and services are briefly described. Bulletin MT-4. Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

(See No. 17)

Surface Finish Measurement

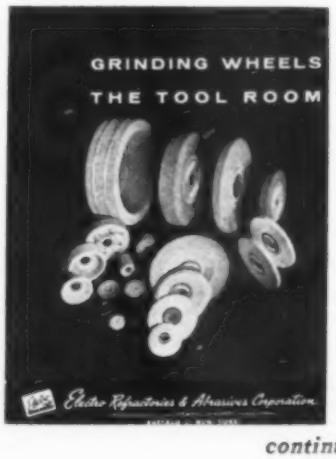
Use postpaid card. Circle No. 18

Six-page illustrated catalog folder describes two models of the Brush Surfindicator, a portable instrument for measurement of surface microfinish on metal, plastic, glass or other materials, regardless of shape or composition. Brush Instruments, 37th and Perkins, Cleveland 14, Ohio.

Toolroom Grinding Wheels

Use postpaid card. Circle No. 19

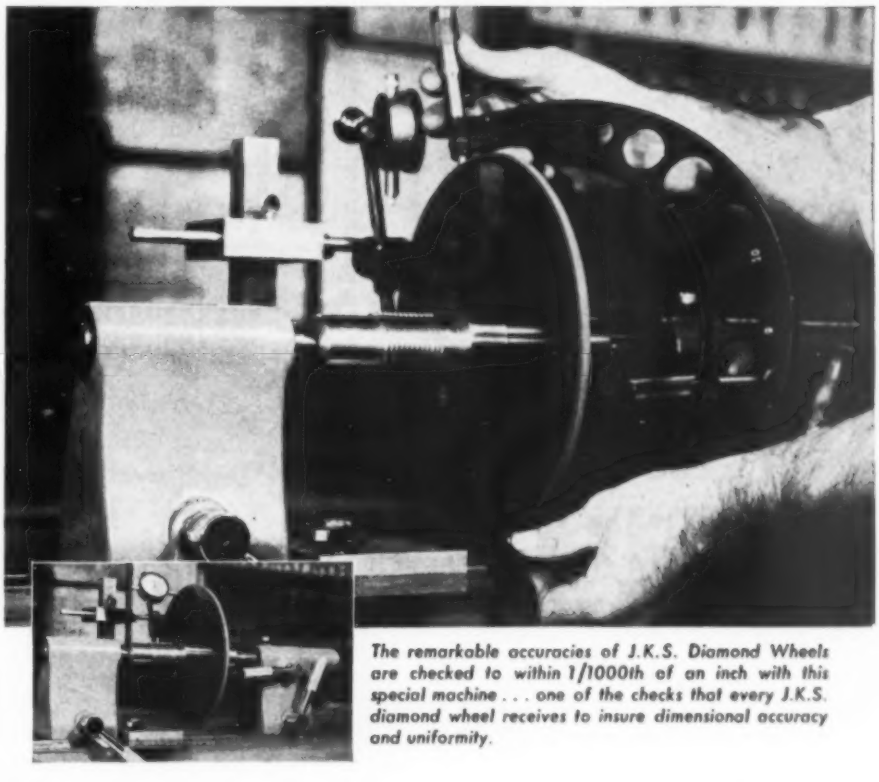
Listings and general specifications of abrasive wheels for grinding high speed steels and tungsten carbide, together with discussion of the operation, highlight a 4-page folder, Bulletin T-661, of Electro Refractories and Abrasives. 88A abrasive is also described. Electro Refractories & Abrasives Corporation, 344 Delaware Ave., Buffalo 2, New York.



continued

J.K.S. makes sure!

GET EXACT DIMENSIONAL ACCURACY AND UNIFORMITY IN EVERY DIAMOND WHEEL



The remarkable accuracies of J.K.S. Diamond Wheels are checked to within 1/1000th of an inch with this special machine . . . one of the checks that every J.K.S. diamond wheel receives to insure dimensional accuracy and uniformity.

At J. K. Smit & Sons—America is setting the pace for the World!

From J. K. Smit plants come natural and man-made diamond wheels that are cutting grinding costs and speeding production in plant after plant around the world . . . wheels in all bonds that permit work to closer tolerances, that last longer, that are made with special characteristics for more types of work . . . and that are duplicated with absolute dimensional and physical accuracy in wheel after wheel.

Behind these developments are special J.K.S. techniques and quality controls . . . new precision molding presses . . . exclusive bond formulas . . . unique J.K.S. machines and other devices for controlling and checking on physical and chemical properties, on wheel quality and performance . . . the custom-type manufacture of each wheel to individual specifications . . . continuous wheel research and the accumulated know-how of generations of J.K.S. craftsmen.

Get This Extra Wheel Value For Your Own Plant . . . Write Today for the New J.K.S. Diamond Wheel Catalog (#65) . . . a must for everyone who buys or uses diamond grinding wheels.

J. K. Smit & Sons, inc.

"First in Experience and Service"

HOME OFFICE AND PLANT: **MURRAY HILL, N. J.**

Grosse Ile, Michigan

Use postpaid card. Circle No. 241

Now you can settle out large particles from your mineral-type oil or water-soluble coolants—with new efficiency and economy. You get greater mileage from every gallon of coolant, increase tool life, and improve work quality.

Olson's all-new Conveyorized Settling System makes the settling operation 70-90% efficient, depending on the viscosity of the coolant and size, weight, and nature of the contaminating particles. Operation is automatic from the start to the point of dropping sludge into the sludge disposal container. The system entails no servicing, such as adjusting or changing a filter medium. Only occasional emptying of the sludge pan is required.

The conveyor ramp can be built to extend upward to discharge at any height above floor level. Conveyor flights, chain and sprockets are made extra sturdy to handle the heaviest sludge load conceivable in a settling operation.

The Olson Conveyorized Settling System is available in tank sizes with holding capacities of 250 to 5000 gallons to suit your needs—whether applied to individual machines or central systems. For complete information, mail the coupon today.

ALL NEW

FROM OLSON

CONVEYORIZED

SETTLING SYSTEM

OLSON FILTRATION ENGINEERS *American Laundry Machinery Industries Division of McGraw-Edison Company, Cincinnati 12, Ohio*

OL-16-G

Send complete information on the all-new Olson Conveyorized Settling System.

*Name*_____

*Firm Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

Use postpaid card. Circle No. 242

LITERATURE continued

Diamond Dressing Tools

Use postpaid card. Circle No. 20

"Cemented Diamond Particles," diamonds set in powdered metal, are discussed in a 16-page brochure from Koebel Diamond Tool Co. Various types are sketched, and typical applications are described. CDP tools need no resetting, are entirely consumed in use. Catalog No. 861. Koebel Diamond Tool Co., 9456 Grinnell Ave., Detroit 13, Michigan.

(See No. 20)

Gear-Tooth Checking System

Use postpaid card. Circle No. 21

Data Sheet 1132 describes new checking system which simplifies analysis of gear and spline tooth-spacing errors. Eccentricity and index errors separated by graphic means for either straight or helical gears or splines. Michigan Tool Company, 7171 E. McNichols, Detroit 12, Mich.

Dust Control Equipment

Use postpaid card. Circle No. 22

A number of effective methods for controlling industrial dust and fumes are described in a 20-page bulletin by Pangborn Corporation. Prefaced by a short non-technical discussion of the advantages of dust control is a list of essentials. Bulletin 922A. Pangborn Corporation, Hagerstown, Maryland.

Precision Expanding Mandrels

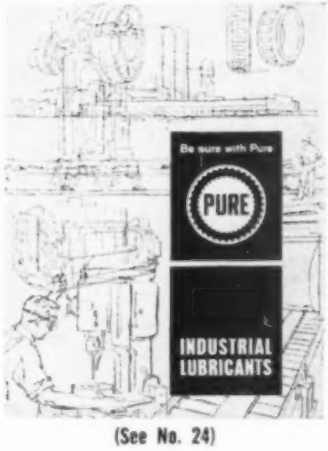
Use postpaid card. Circle No. 23

Erickson Tool Company outlines complete line of precision expanding mandrels in 8-page, 2-color catalog. Mandrels chuck internally within 0.0005 TIR, permit high cutting speeds, heavy feeds. Erickson Tool Company, Solon, Ohio.

Industrial Lubricants

Use postpaid card. Circle No. 24

The Pure Oil Company has published a 16-page brochure outlining its complete line of industrial lubricants and spelling out a program to cut costs by streamlining their use. Free counseling service is also offered to customers. The Pure Oil Company, 200 E. Golf Road, Palatine, Illinois.



(See No. 24)

Flat Lapping Machines

Use postpaid card. Circle No. 25

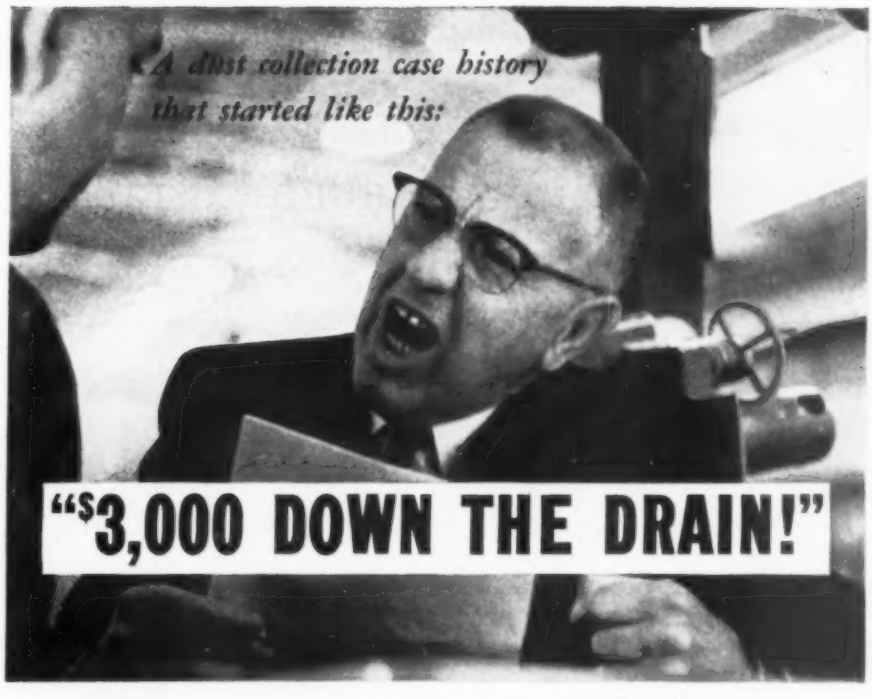
Expansion of the line of Spiralap flat lapping machines to include dual unit 18" diameter plate models is announced in a four-page folder (SPL-G1). Marine Pumps, Inc., Division of Diesel Control Corp., 226 N. Marine Avenue, Wilmington, Calif.

Diamond Plated Files

Use postpaid card. Circle No. 26

Specifications and sketches of Alpex diamond plated files and carbide bonded diamond mandrels are included in two-color punched spec sheet. Files have been field tested for over a year. Alpex Wheel Company, Teaneck, New Jersey.

"ICBM nose cone? Lemme see that spec sheet."



"Get rid of that DUST!"

"The boss was sore and I was on the spot.

"He shoved the report from the efficiency engineer at me. I read it: 'Yearly loss due to machine wear, misalignment and down time . . . $3,000. Major cause . . . abrasive dust.'

"The boss pointed his finger at me, 'Get rid of that dust and get rid of it fast!' "

Now, it was my problem, and I was on the spot.

"First thing I did was to check into a central dust collecting system. But the lowest bid I could get was $8,000. Too much.

"Then I came across a Torit ad, offering economical portable dust collectors.

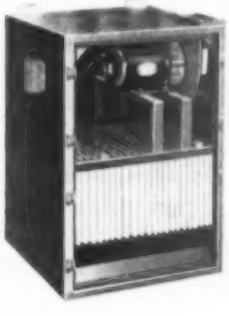
"Two days after my call Torit engineers showed me how in only one week they could install a portable, unitized Torit Dust Collector at each of our eight grinders, trapping dust right at its source—cleaning the air throughout the entire plant.

"Total cost? Only $2400.00. That's a $5,600.00 saving over the lowest priced central system.

"You guessed it—we installed the eight Torit Collectors."

Torit solved my problem

"This year when we received our report it read: 'Loss due to machine wear, misalignment and down time...$340.00.' A saving of $2,660.



"This time the boss was all smiles. He slapped me on the back, 'Charlie, you did a fine job getting rid of that dust. Frankly, I didn't think it could be done with such a small investment.'

"Now there's a pretty nice fellow to work for.

"If you've got a dust problem, or are about to have one, write the Torit people. They've manufactured and sold more dust collectors than anyone else in the U.S.A. Chances are they can help you the way they helped us."

TORIT manufacturing company

Dept. 511, 1133 Rankin St., St. Paul 16, Minn.

Use postpaid card. Circle No. 243

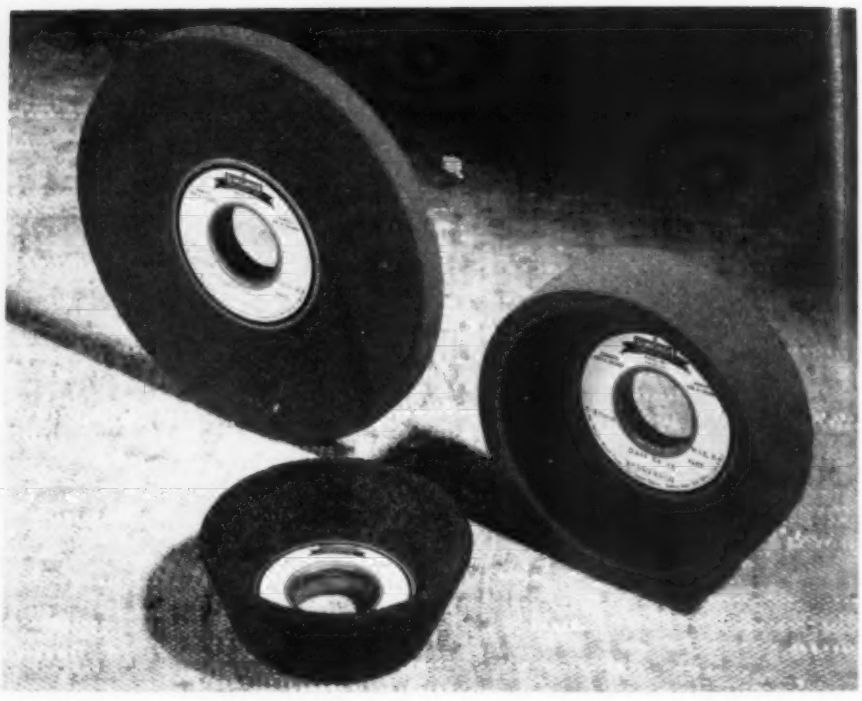
MAN-MADE RUBIES USED IN GRINDING WHEELS

A brand new abrasive grain in combination with a distinctly different vitrified bond produces a distinctive colored grinding wheel which, according to the Simonds Abrasive Company, promises new potentials for abrasive machining.

The wheel is purplish-red color by virtue of the synthetic ruby grain which is specially processed crystalline aluminum oxide, trade named RA Borolon. The new vitrified bond known as V8 is the product of new materials and new firing techniques. The resultant wheel is a scientifically predictable cutting tool always "on grade."

This ruby wheel has friability and toughness combined to an exceptional degree, which results in superior form holding with cooler, faster grinding than with conventional grains and bonds. Its performance is spectacular on the hardest, toughest tool steels—including the abrasion resistant types. Requiring fewer specifications to do a wider range of jobs, the new ruby wheel excels for surface grinding, internal, tool and cutter, and other precision work.

The abrasive has been designed for precision grinding of hard tool and die steels, including air hardening and oil hardening types, high carbon high chrome types, and high temperature abrasion resistant types.



It is especially well adapted for the newer metals used in rocket and missile programs.

The ruby wheel is identified as Simonds RA Borolon grinding wheel with V8 bond. It is available in straight, cup, dish and flaring cup shapes, and in abrasive segments.

Simonds Abrasive Company, Tacony & Fraley Streets, Philadelphia 37, Pennsylvania.

Use postpaid card. Circle No. 41

PORTABLE PHOTOELECTRIC TACHOMETER FAST, PRECISE

The Dayton Safety Tach is a completely portable photoelectric tachometer for fast and accurate measurement of both rotating and reciprocating machinery. Originally developed for checking grinding wheel speeds, the unit can be used on almost any type of moving machinery wherever a part turns or reciprocates.

With available speed ranges from less than 100 rpm to 24,000 rpm, the direct reading meter requires no calculations. The operator needs only to press the button, point the beam, and read the speed. It reads instantly either constant or changing speeds.

The instrument requires no mechanical or electrical contact with moving machinery. It can be calibrated easily, without special equipment.

Dayton Safety Grinding Wheel Division, Simonds Worden White Company, 1101 Negley Place, Dayton 7, Ohio.

Use postpaid card. Circle No. 42

OPTICAL ANGLE CHECKER ACCURATE TO ¼ SECOND

By combining a plane mirror and a miniature Ultradex indexing table AA Gage Co. has developed the 360-sided "Optic-Mechanical Polygon" for checking or calibrating angles.

This instrument is guaranteed by the manufacturer to be accurate within ¼ second of arc, total accumulated error.

The base is made up of two plates, each with 360 serrations, that are separated when the operating handle is depressed. The top plate can then be moved through any angle and lowered onto the bottom plate. Regardless of what degree of angle is being checked, all 360 serrations engage. This patented principle allows the serrations to seat uniformly so that the instrument maintains its accuracy through use.

AA Gage Co., 350 Fair Street, Detroit 20, Mich.

Use postpaid card. Circle No. 43

ELECTRONIC DEVICE GRADES WHEEL HARDNESS, UNIFORMITY

An electronic device called the Dyna-Grader has been developed for testing the hardness and uniformity of a grinding wheel across its entire cutting face while the wheel is rotating. Test results, electronically recorded on a permanent tape, will provide a guide for wheel manufacturers to improve uniformity, and help users by improving quailty control of their production grinding.

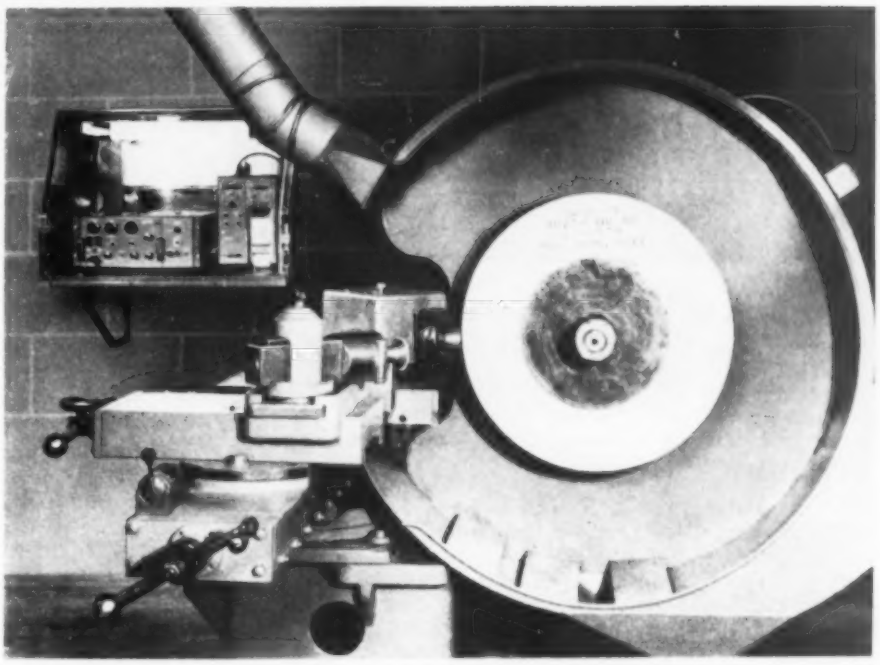
Developed under the direction of the research and development department of the Macklin Company, Michigan grinding wheel manufacturer, the testing device passes a conical steel cutter across the face of the moving wheel and crushes minute amounts of abrasive from the wheel surface. Forces required to crush the abrasive are electronically measured.

The Dyna-Grade system of wheel testing is now in use at the Macklin Company for inspection and quality control on their high production grinding wheels.

Macklin plans to market the unit in the very near future.

Macklin Company, Jackson, Mich.

Use postpaid card. Circle No. 44

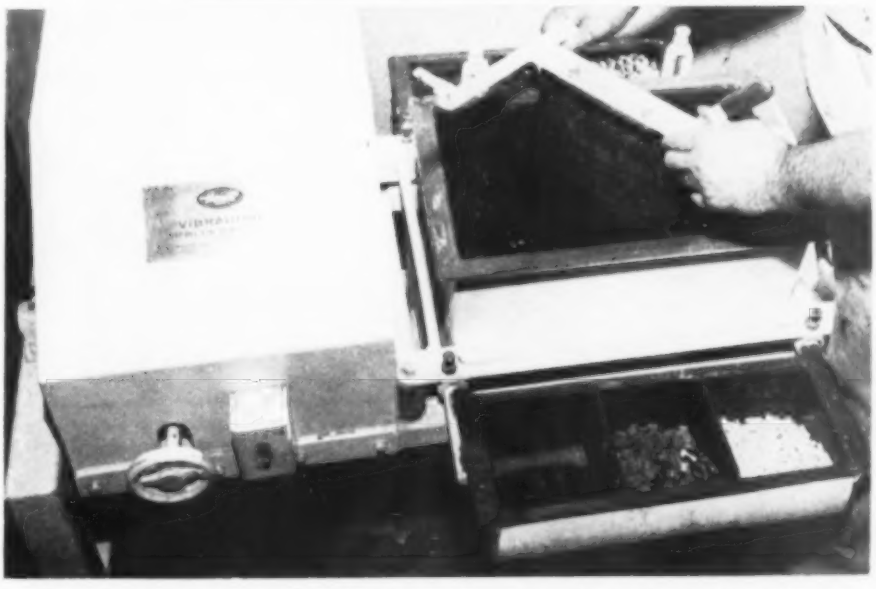


PIGGY-BACK TUBS DO 7 FINISHING JOBS AT ONCE

Seven finishing jobs can be done simultaneously with new attachments for a vibrating tub produced by Minnesota Mining and Manufacturing Co. (3M).

Five side tubs and a divider for the main tub provide seven compartments to finish different parts at the same time in a "Honite" brand Vibrahone finishing machine. The piggy-back units save time, labor and capital investment in finishing small runs of different sized parts.

The steel side tubs are lined with rubber to cushion work pieces.

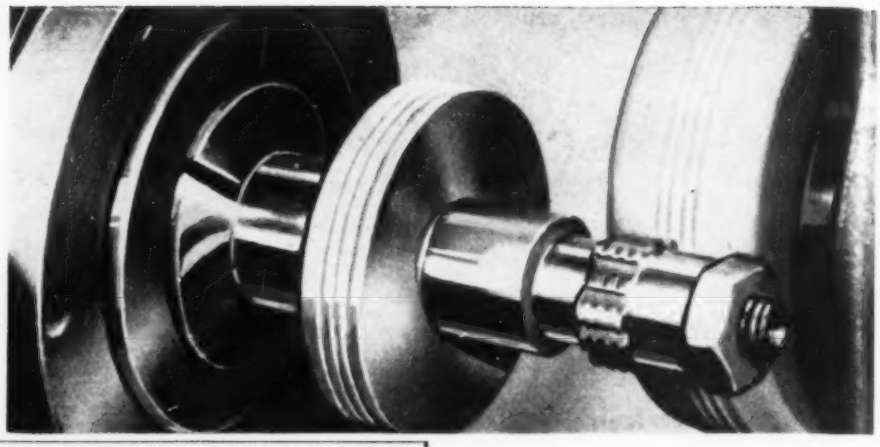


Piggy-back tubs are optional with the 1½ cu ft Vibrahone machine, but attachments can be made to fit any size. Either two, three or five piggy-back tubs can be attached.

3M's Vibrahone tubs, introduced last spring, are equipped with rubber mounts instead of springs to retain more than 98% of the vibrating force. The tubs are detachable and tilt for easy draining.

Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minnesota.

Use postpaid card. Circle No. 45



WHEEL CRUSHER MADE FOR R-O FORM EQUIPMENT

The dressing of other than simple forms, on grinding wheels, can be time-consuming and demand unusual skill on the part of the grinder hand. Crushing the form in the wheel speeds up the job and reduces the "cut and try" customary in shaping formed wheels, making it possible to keep the wheel sharp at all times and maintain tolerances on the work.

R-O Manufacturing Co. now offers to design and build wheel crushers for use on R-O universal form relieving equipment.

These are available in two types: One is the collet held crusher which requires that the work be removed from the collet, although set-up of the fixture is not disturbed. The second type crusher, which can only be used where the nature of the work permits, is machined as a part of the arbor on which the work is held. With this type crusher, nothing is involved in redressing the wheel except to slide the table so that the crusher form is brought opposite the wheel. After dressing, the table is moved to bring the work back to position.

Recommendations and quotations on wheel crushers will be furnished upon receipt of sample part or part print and other pertinent data.

R-O Manufacturing Co., 31171 Stephenson Highway, Madison Heights, Michigan.

Use postpaid card. Circle No. 46

SURFACE SET CORE BITS

New Throw-A-Way type core bits are manufactured with Grade A diamonds random set in a non-spiral pattern. Though non-resettable, these surface set Throw-A-Ways result in faster cutting in critical areas and steel reinforced concrete.

These new Clipper bits are low in initial cost, ideal for contractors whose operation level does not justify the use of resettable diamond core bits.

Clipper Manufacturing Company, Suite 147, 2800 Warwick, Kansas City, Missouri.

Use postpaid card. Circle No. 47

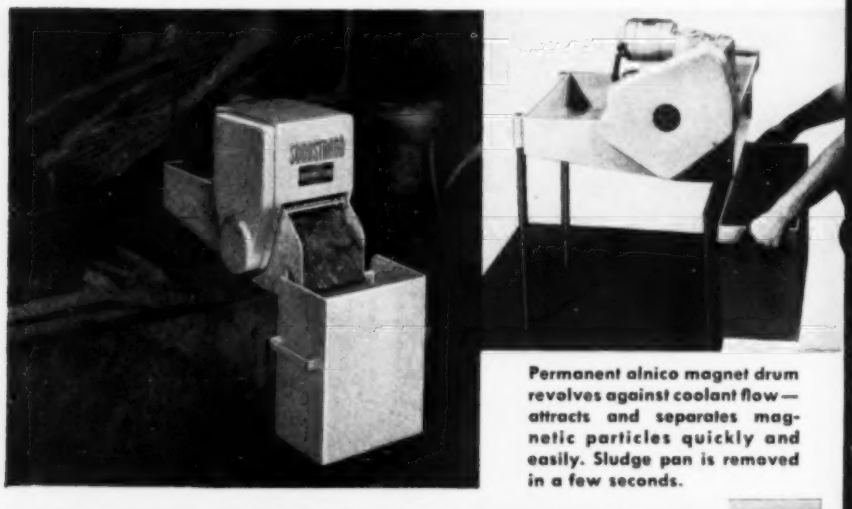
In no time at all, you can install a Sundstrand coolant separator

. . . to lengthen wheel life, improve finishes, reduce downtime, eliminate sump cleaning, and the number of coolant changes.

Installation is easy, separator can be placed right on open coolant tanks in most machines — no repiping or fitting necessary.

Maintenance is quick and easy. Separated material is deposited into a sludge pan which can easily be removed for cleaning in a few seconds, without any tools. No more sumps to be cleaned out.

You will save money and improve the quality of your grinding, honing, and gear shaving operations with Sundstrand magnetic coolant separators. They're available in four capacities: 25, 50, 75, and 100 gpm.



Permanent alnico magnet drum revolves against coolant flow — attracts and separates magnetic particles quickly and easily. Sludge pan is removed in a few seconds.

Bulletin A368 gives complete data. Write for your copy today.

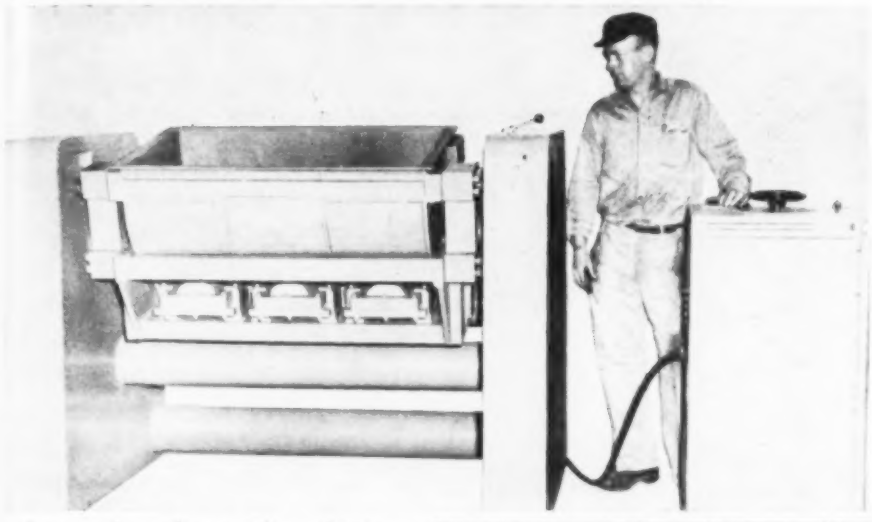
MARK OF RELY-ABILITY

SUNDSTRAND POWER-GRIP

SUNDSTRAND-AMERICAN BROACH
ANN ARBOR, MICHIGAN
Division of SUNDSTRAND CORPORATION

Use postpaid card. Circle No. 246

VIBRATORY FINISHER USES ONLY ONE MOVING PART



A new 6 cu ft capacity vibratory finishing machine uses a unique resonant electro-magnetic system to give shaking forces up to 50 Gs, and features only one moving part—the tub.

Shaking force is set by a single knob, from 0 to 5/16 inch amplitude, and power is standard 220-volt ac operating through three pair epoxy compound impregnated and encapsulated heavy-duty magnets. The suspension is such that a continuous rotary turnover motion provides 100% scrubbing action between media and parts, eliminating packing. Air-dumped tub is 37" x 20" x 15" deep and holds a 750 lb charge.

Vibrodyne Model V-600 is for deburring, radii-forming, descaling, flash removal, cleaning and polishing.

The manufacturer claims that Vibrodyne's powerful shaking force makes it many times faster than conventional tumbling, and that the tub lining is the only thing that can wear out. The 2750 lb. machine does not need to be bolted to the floor.

Vibrodyne Division, Globe Industries, Inc., 125 Sunrise Place, Dayton 7, Ohio.

Use postpaid card. Circle No. 48

LOW-PRICED PRECISION GAGE CHECKS SCRATCHES,GROOVES

A new scratch depth gage measures scratches, grooves, and other indentations on flat or curved surfaces with speed and accuracy. In its ease of operation and portability the gage provides a precise, inexpensive and non-destructive means for determining whether surface indentations fall within prescribed limits.

It works equally well for measuring raised portions of workpieces. The lowest priced and most compact instrument of its type, the scratch depth gage was designed primarily for the inspection of materials, (wing skins of aircraft, high pressure pipe and tubing, etc.), where scratches exceeding specific limits could result in structural failure. Additional applications include quality control in the metal and plastic industries, measurement of etching depth for photoengraving, etc.

Highly precise measurements to an accuracy of plus or minus one ten thousandth (0.0001") of one inch or 5% of the depth, whichever is

continued

No. 3 Moore Jig Grinder at Wauconda with the slot-grinding attachment in position. Accessories like these bring out the full versatility of Moore equipment and help solve "impossible" jobs.

"Moore equipment enables us to produce millions of parts to exacting tolerances"

says Kenneth Pearson, Co-owner, Wauconda Tool & Engineering Co., Inc. Algonquin, Illinois.

"Specializing in out-of-the-ordinary, close-tolerance press and multi-slide work, it is essential for our plant to have the best toolroom equipment.

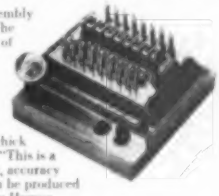
"Our Moore Jig Borers and Jig Grinders make it possible for us to do the unusual in the line of accuracy required for our precision die work and enable us to produce millions of parts to the exacting tolerances that are so essential in computer, missile, instrument and electronic components.

"These machine tools do the ordinary as well as the extraordinary, day in day out, and are in constant use. The rigidity, durability and precision built into Moore equipment makes them unequaled for our exacting requirements.

"We base our business on the premise that quality is remembered long after the price is forgotten. Moore equipment contributes in large measure to this quality."

Write today for literature describing the unique features of No. 3 Moore Jig Borers and Jig Grinders.

Moore Special Tool Company, Inc., 723 Union Avenue, Bridgeport 7, Conn.



Contour grinding on a punch assembly for an intricate progressive die. The entire shaped contour, consisting of individual inserts, has been jig ground, with outside and inside radii ground in the assembled state and the straight portions ground as individual inserts. Note coin for comparative size. The stamping produced is .006" thick and must be absolutely burr free. "This is a good illustration of the versatility, accuracy and high degree of finish that can be produced on Moore equipment," says Henry Harper, Co-owner of Wauconda Tool & Engineering Co., Inc.

ONLY MOORE TOOLS CAN OFFER THIS COMPLETE PACKAGE OF PRECISION

MOORE No. 3 JIG BORER
Locates and bores holes to less than a "tenth"

MOORE No. 3 JIG GRINDER
Locates and grinds holes to less than a "tenth"

MOORE UNIVERSAL MEASURING MACHINE
Measures to one-third of a "tenth"

MOORE ROTARY TABLE
Divides the circle to less than 2 sec.

Use postpaid card. Circle No. 247

greater, can be made for indentations with depth of from two ten thousandths (0.0002") to sixteen thousandths of an inch (0.016"); widths from one thousandth to fifty thousandths of an inch (0.001" to 0.050") can be determined to plus or minus one thousandth (0.001"). The same range applies to the measurement of raised portions. In addition to depth and width measurements, the gage clearly shows the contour of the indentation.

The top quality optical system has been especially designed to fit a lightweight, compactly-sized housing so that the instrument can be carried easily from one plant area to another for various surface inspections. Further portability is due to the fact that the scratch depth gage is battery operated, although a transformer is available for use with 115-V, 50-60 cycle ac power.

Bausch & Lomb, Incorporated, Rochester 2, New York.

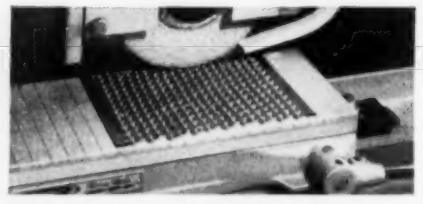
Use postpaid card. Circle No. 49

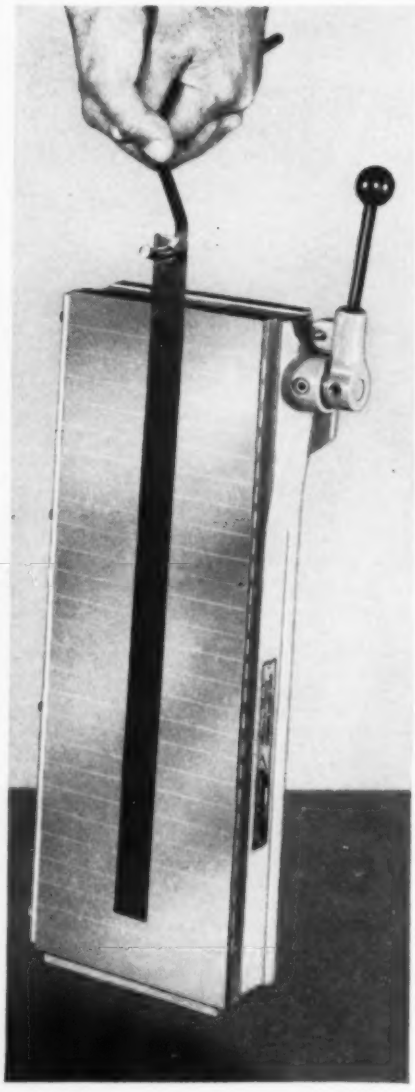
53-pound grip on 1/32" thin strip...

B&S chuck demonstrates holding power sufficient for 8 hp grinding machine load — by supporting its own weight on 1" x 1/32" steel strip.

New Brown & Sharpe Micro-Mesh Chuck

holds parts as thin as .001" for grinding!





Make big savings, grinding or machining small parts. Use the *only* magnetic chuck that grips work as thin as .001", tight enough for production cuts.

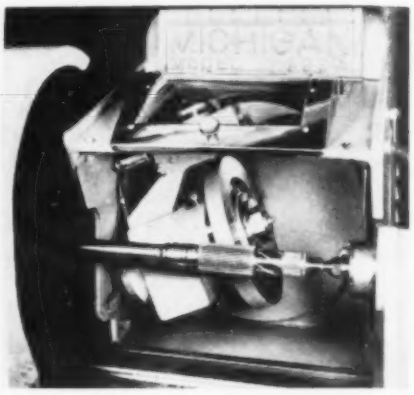
Close-spaced, barium-ferrite (ceramic-type) permanent magnets — no dead spots or weak zones — powerful, unbroken field, over the entire working surface.

Ask your B&S distributor for new Micro-Mesh Chucks! Brown & Sharpe Mfg. Co., Prov. 1, R. I.

Brown & Sharpe PRECISION CENTER

Use postpaid card. Circle No. 248

4-MOTION HONING ACTION FOR ABRASIVE GEAR FINISH



In special set-up, a non-toothed (smooth) hone is used to finish OD of spline shaft.

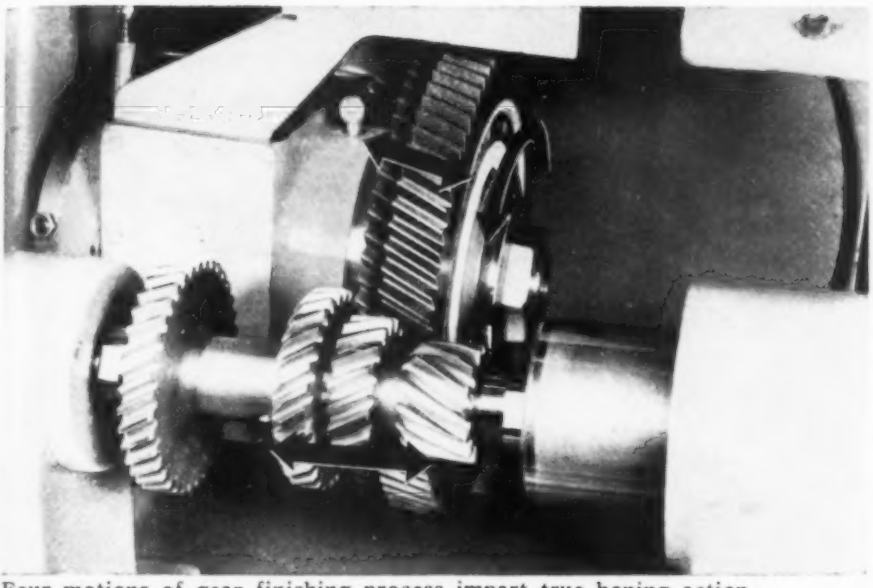
A new approach to abrasive finishing for hardened gears and cylindrical parts embodies a four-directional relative movement between the work-piece and the abrasive tool. Developed in Michigan Tool Company's research laboratories, the new process enables better surface finishing of gears and similar parts after hardening.

Along with the process, a range of abrasive tools from extremely fine to coarse for fine finishes or rapid finishing have been developed.

With the new process, nicks and burrs can be removed and some dimensional errors in lead and runout can be corrected, since the process does not depend solely on relative rotary motion between tool and workpiece. The process provides smoother and quieter running of parts without matching or lapping.

The operation has been incorporated as standard on the new 999-A Michigan abrasive gear finishers. In addition, a head-modification kit is available to convert former models to the new process in the field.

For finishing gears, the abrasive hone used is a gear-like tool made of new special high strength plastic impregnated with abrasive. It is



Four motions of gear finishing process impart true honing action. Arrows show three; fourth is created by crossed axis relationship between hone and workpiece.

rotated in tight mesh with the hardened work gear at crossed axis. The honing action on the gear teeth is achieved by combining four motions —an in-mesh rotation under controlled load; a crossed axis relationship between hone and work; a high speed axial oscillation of the tool in a ratio of 3 oscillations per 1 revolution of the tool; and a reciprocating motion which traverses the work a preset amount across the hone for the gear's full face width.

In addition to finer finish, the "Four-Motion" movement results in faster processing and longer tool life than has been possible before in similar type machines.

Hone rotation is variable from 150 to 600 rpm and table reciprocation can be independently varied, thus allowing high spindle speed and slow table reciprocation or vice versa. Tool head angle is variable up to 25 degrees. Axial movement of the hone is approximately 1/16" and is fixed at a ratio of 3:1 with the rpm.

The 999-A machine is easily adaptable to full automation or to automatic loading. Manual loading is very simple due to minimum distance from machine front to centers. Optional equipment includes automatic loading device, crowning-taper attachment, internal gear finishing head and manual or automatic tool dresser.

Michigan Tool Company, 7171 East McNichols Road, Detroit 12, Mich.

Use postpaid card. Circle No. 50

COMPACT COMPRESSED AIR REGULATOR ONLY 7" LONG

The Wilkerson Corporation's "Combomatic" unit has been designed for filtering, regulating and lubricating compressed air with one package unit. Only 7" long and 4¾" high, it takes very little space in a pneumatic circuit.

The unit incorporates a completely automatic drain trap on the filter. This prohibits moisture from accumulating in the sump of the filter.

Model 64240-2 has a capacity of 12 cfm at 100 psi air pressure, is available from stock in ¼" P.T. It is used on die grinders, small air tools, and small air motors.

Wilkerson Corporation, 1559 West Mansfield, Englewood, Colorado.

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continued

GRIND POLISH BUFF DEBURR

with a *Hammond* **ROTARY AUTOMATIC**

SEND SAMPLES

and we'll show you how much you can speed production and cut costs.

Model "K" Hammond Automatic Finishing Machines are made in 34", 46" and 62" table sizes. These models are either continuous or for indexing at 150 to 1700 indexes per hour. Head styles include floating, non-floating with 3 H.P. to 20 H.P. range. Also available are attachments for converting heads from buffing to abrasive belt polishing. The Hammond Model "K" will speed up your grinding, polishing, buffing, brushing and de-burring operations. Send us samples and learn how much you can speed them up.

Hammond Machinery Builders INC

1651 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

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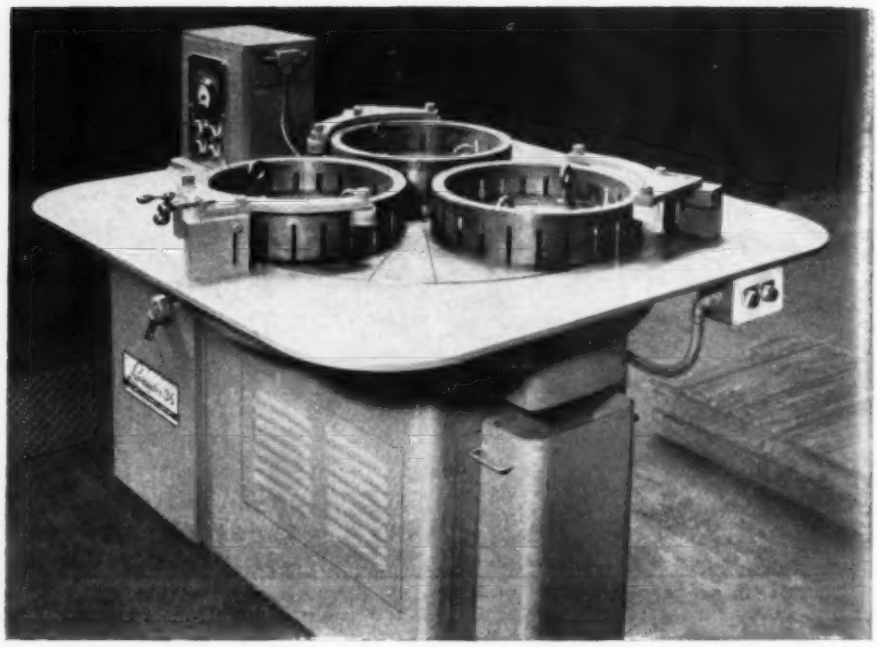
NEW EQUIPMENT continued



REDESIGNED LAPMASTER SHOWS NEW CONCEPT

A new Model 36 Lapmaster (Lapmaster Division of the Crane Packing Company), a completely redesigned version of the present 36" Lapmaster, offers a new concept in production lapping efficiency.

Among a number of new features, the new Model 36 includes a new abrasive distribution system which maintains the correct mixture of compound to vehicle from initial filling to the last drop. Pressure pumping at a constant head assures uniform deposit at the lapping stations. It also provides an adjustable flow control to obtain maximum stock removal. The pump and tank are mounted on the inside of door in the machine base which swings out for filling ease, but is out of the way during production.

This compact Lapmaster has been designed to provide the ultimate work efficiency within the smallest floor area. The large, wrap-around adjustable work table that may be raised or lowered to be in same plane with lap plate, and a remote start and stop station permit easier loading and unloading of parts from almost any position. Conveniently located main control column includes automatic timer for presetting lapping cycle. A hand screw is provided for easy adjustment of conditioning ring to compensate for normal wear patterns in the lapping plate.

The Model 36 Lapmaster equipped with either 3 or 4 conditioning rings is also available with pneumatic lifts to facilitate raising and lowering of conditioning rings and/or pressure plates. As with all Lapmasters, the new models will lap parts of almost any shape, form or material on a production basis within tolerances of one light band or less and uniform micro-inch finishes of 2 to 3.

Crane Packing Company, Dept. GF-3, 6400 Oakton Street, Morton Grove, Illinois. In Canada: Crane Packing Company, Ltd., Dept. GF-3, Hamilton, Ontario.

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DOTCO
AIR TOOLS
FOR MORE PRODUCTIVE POWER

ULTIMATE IN SPINDLE ACCURACY
RUN-OUT .0005 MAX.

Built with power-plus to do MORE work at greater speed, with less maintenance down-time and longer tool life—DOTCO's wide range of air tools feature distinctive 4-vane rotary air motors that run cool and vibration-free at higher speeds with extreme accuracy, reduce user fatigue, hold maximum run-out to .0005 on all collet-type grinders.

Erickson collet chucks are standard.

Straight or right-angle models for manual or machine operation of burs, drills, mounted wheels, sanding discs, routers, etc.; handy lever, button or push-pull sleeve valve control.

FACTS { STRAIGHT TOOLS & ANGLE TOOLS

2 FACTS FOLDERS illustrate newest DOTCO air tools with data and specifications to make selection easy for every air tool requirement. Write for your Bulletins 102 and 103.

D DOTCO, INC.
HICKSVILLE, OHIO

Use postpaid card. Circle No. 250

ADD ECONOMY MODEL ABRASIVE CUTTING UNIT

Designed to provide the advantages of abrasive cutting at a relatively low investment, the new Campbell model 102-A abrasive cutting machine cuts solids up to 4" square, pipe and tubing up to 6⅝" O.D., angle iron up to 6" x 6", channels up to 8", and flat stock up to 6" x 1". It is versatile, as a simple vise type clamp firmly holds a variety of shapes.

It cuts most metals at a rate of 3 to 4 seconds per square inch. For example, a 4 square bar of steel can be severed in less than a minute. Annealing costs are eliminated, and deburring and finishing costs are reduced substantially or eliminated entirely.

Excellent quality of cuts are obtained due to the Campbell oscillating feature, easily adjustable carbide-tipped wheel guides, and superior coolant distribution. The oscillating action permits cutting larger cross sections than is practicable with straight chop-stroke machines, assures more cuts per wheel, gives better quality cuts, requires less cutting pressure and reduces operator fatigue.

Safety features include a stationary wheel guard which gives complete operator protection and fiber glass reinforced plastic curtains to prevent coolant splash. Push button station is at chest level with single "off" button and for convenience the operating handle is adjustable.

A large separate coolant tank is furnished with the machine and is mounted on casters to permit easy removal for cleaning. Separate compartments settle out sludge and keep coolant clean. Coolant is conveyed to coolant distributor inside the wheel guard through a hose. A variety of work holders and work support stands are available as optional equipment.

Allison-Campbell Division, American Chain & Cable Company, Inc., 929 Connecticut Avenue, Bridgeport 2, Connecticut.

Use postpaid card. Circle No. 53

EPOXY COATING STOPS STICKING OF ABRASIVES

A new coating, Epoxy Resiweld, prevents abrasive and granular materials from sticking to bins, hoppers, and all types of storage and materials handling equipment.

continued

DIAL TABLE—built to fit your exact requirements.
#55 HEAD—compact, rugged, multi-position polishing and buffing head. Operates right or left.
VERSATILE
"PRODUCTION-PROVEN"
FINISHING EQUIPMENT
from MURRAY-WAY
INDEXING CONVEYOR—incorporates exclusive Murray-Way indexing or continuous features.
EDGE GRINDER—for precision grinding of products such as floor tile.

Murray-Way offers a complete line of standardized, economical finishing equipment for both large and small shops. In addition, experienced Murray-Way production engineers, working with the finest manufacturing facilities available, will gladly help with your specialized production problems.

Write for detailed literature.

MURRAY WAY

MURRAY-WAY CORPORATION

P. O. BOX 180 • MAPLE RD. EAST
BIRMINGHAM, MICH.

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This inexpensive easy-to-apply material imparts an extra-hard glass-like covering on practically any surface. Tests indicate that it resists wear and practically eliminates sticking. It can be brushed, rolled, or sprayed on, and requires minimum drying time.

Frederic B. Stevens, Inc., 1800 18th Street, Detroit 16, Michigan.

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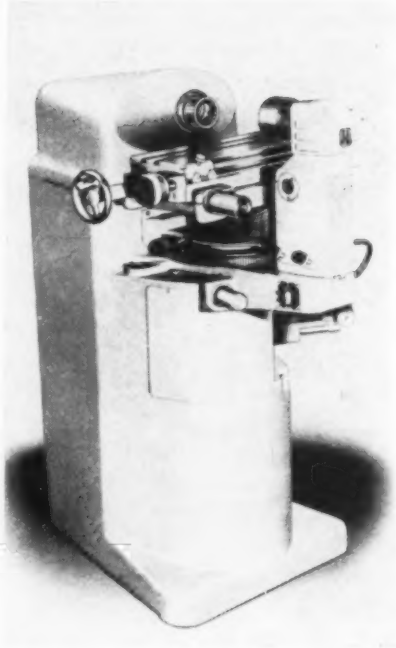
ECONOMY COMPARATOR UNITS PROVIDE LARGE CAP.

Large area lenses and generous machine capacity are combined in two new Jones & Lamson direct projection comparators. These models, having direct projection, can be used in a dark or semi-dark room. Shadow images may be viewed on any suitable flat surface.

Model DPC has a single column support and a measuring capacity of 4" vertically, and 5" or 8" horizontally depending on the worktable selected. Model DPC-ER has double



column support and a measuring capacity of 8" vertically and 10" horizontally.

Both models give full, accurate coverage up to 60" screen size at all magnifications. Standard (FC-30) lenses are provided for magnifications from 5X to 100X. Powers above 100X are also available for special applications.

These new J & L direct projection comparators are currently in use for the measurement and inspection of a wide range of parts including: gas turbine blades, wind tunnel aircraft models, hob and milling cutters, templates, contour turned parts.

Jones & Lamson Machine Company, 522 Clinton Street, Springfield, Vermont.

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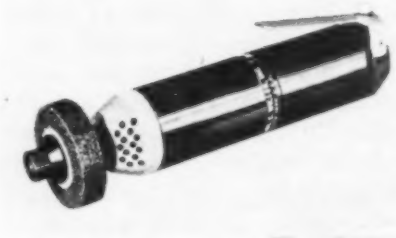
SMALL-WHEEL GRINDERS AVAILABLE WITH GOVERNORS



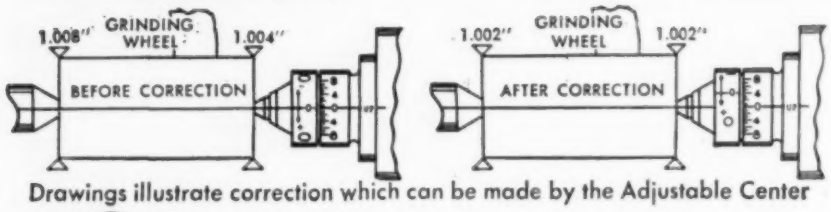
Small-wheel grinders with governors, for developing maximum power at controlled speed on tough grinding jobs, have been added to the Thomas C. Wilson line of portable pneumatic tools.

Wilson has added to its line of Series 921 grinders spindle and collet-chuck models with lever or

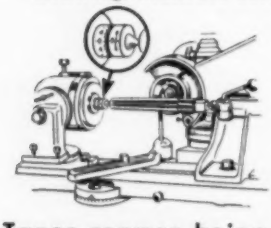
NEW . . . fast, easy CENTER ALIGNMENT for GRINDERS

Center being used on grinder

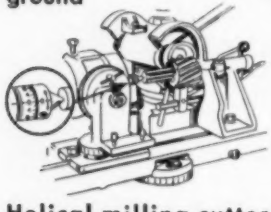
The Enco Micro-Set® Adjustable Center



Drawings illustrate correction which can be made by the Adjustable Center



Taper reamer being ground



Helical milling cutter being reground

- Permits TRUE work alignment from tailstock or headstock on: cylindrical grinders, cutter grinders, gear shavers, lathes and tracer attachments.
- Saves one half the setup time.
- Ends hit or miss table adjustments to obtain precise alignment.
- An inexperienced operator can get a precise alignment—easily—in seconds.
- Quickly pays for itself in time and scrap savings.

MORSE TAPER
No. 2—$49.50, No. 3—$61.50, No. 4—$76.00.

BROWN & SHARPE
No. 6, 7—$53.00, No. 8, 9—$65.00, No. 10, 11—$85.00.

JARNO
No. 6, 7—$53.00, No. 8, 9—$65.00, No. 10, 11, 12—$85.00.

STRAIGHT SHANK
¾"—$56.00, 1"—$68.00, 1¼", 1½"—$80.00.

We also manufacture Precision Lathe Turrets and Tiny-Titan Magnet Base Holders.

Enco MANUFACTURING CO. Dept. 8101 4520 W. Fullerton Ave., Chicago 39, Ill.

Write for catalog and nearest distributor.
Use postpaid card. Circle No. 252

pushbutton throttles and governed speeds of 12,000, 15,000, or 18,000 rpm. For burring, die grinding and contouring, flash removal, snagging, weld smoothing, and similar operations, both models are available with a wide variety of adapters to accommodate small grinding wheels, rotary files, carbide burs, sanding and cutting discs, etc.

The new Series 921 models with governors make possible the application of maximum power on jobs requiring small wheels and compact, lightweight tools.

Thomas C. Wilson, Inc., 21-11 44th Avenue, Long Island City 1, N.Y.

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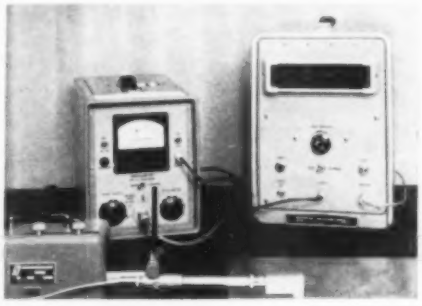
COMBINE RMS, PEAK COUNT FOR SURFACE CHECKING



The Profilometer with peak counter provides a means by which the average-roughness-height readings and the number of surface irregularity peaks above a preset level can be counted easily and accurately. A major break-through in surface texture measurement and control has come about through the development of this means for measuring both peak count and average-roughness-height with a single combination of equipment.

The sheet steel industry is finding the Profilometer with peak counter a valuable production tool for counting the number of surface irregularity peaks on sheet stock, thereby making possible a closer quality control check on the uniformity of surface texture.

By controlling the number of irregularity peaks and average-roughness-height readings on a machined or ground surface prior to the plating operation it is possible to control the appearance of the finished product.

Micrometrical Mfg. Co., 3621 South State Road, Ann Arbor, Mich.

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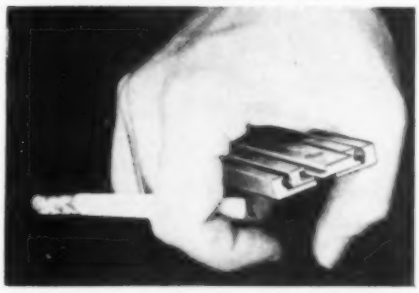
MICRO-SLIDE FOR STANDARD OR MINIATURE EQUIPMENT



A three-section extruded aluminum slide, the Grant Micro-Slide is the smallest, thinnest ball bearing slide made for standard or miniature equipment.

Rated at a minimum load capacity of 100 lbs per pair, the slide is capable of supporting most electronic and industrial equipment. Its size (5/16" thick x 1-5/8" high) enables it to be used even under extreme space restrictions.

Grant Pulley & Hardware Corporation, High Street, West Nyack, New York.

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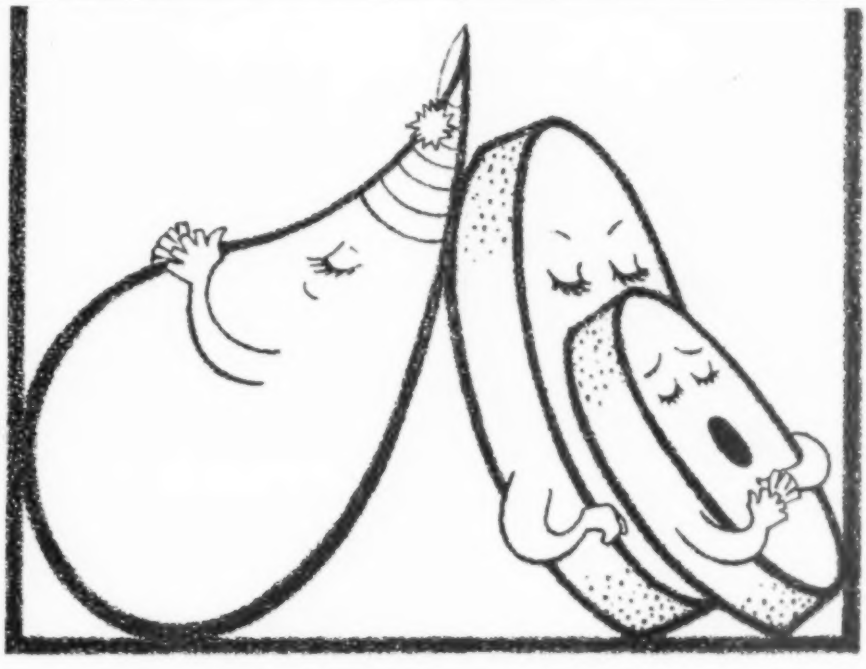

Is a lazy coolant tiring out your wheels?

Do your grinding wheels loaf on the job, so to speak. Do they require frequent dressing because the coolant doesn't provide keen grinding action?

Do you get slower stock removal than you think you should, yet faster wheel wear — with finishes that are disappointing?

If so, switch to White & Bagley *lively* coolants. There's not an idle drop in a tankful of coolant.

W&B Chemical Concentrates help keep wheels open for fast grinding, minimum dressing, yet cost only about a penny per gallon of coolant.

W&B 1500 is recommended for grinding steel.

W&B E-55 is recommended for grinding steel, cast iron, non-ferrous metals.

W&B Lubricant 1888 gives longer wheel or tool life in grinding OR cutting. A high detergent, oil-type, water soluble concentrate.

W&B HD Soluble Oil 2213 prolongs wheel or tool life on tough jobs — gives heavy-duty support plus superior cooling.

W&B Grinding Oil 1572 sets the pace for the whole industry in critical grinding of threads, forms, gears.

Get the facts about LIVELY coolants, from:
The White & Bagley Co., 88 Foster St., Worcester, Mass.

THE WHITE & BAGLEY CO.

Worcester, Massachusetts · Detroit, Michigan

Originators of Grinding Lubricants

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Dependability

diamond wheels by

THE PAUL L. KUZMICK CO.
271-279 GROVE AVE.
VERONA, N. J.

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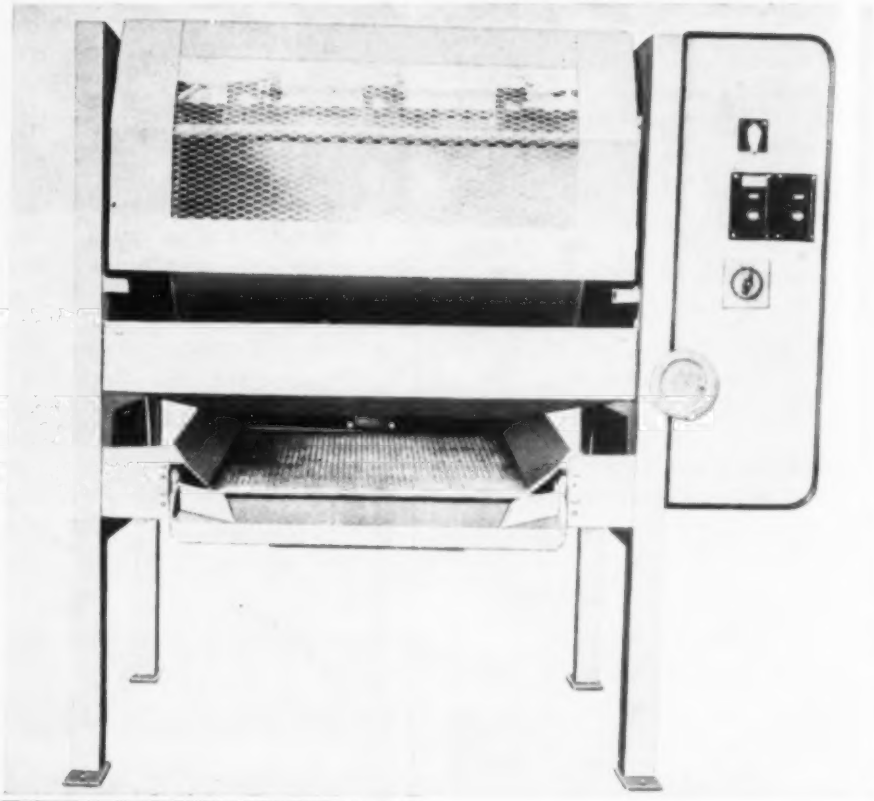
UNIT COMBINES FINISHING, SCREEN SEPARATION



Power-driven screen separating and high-speed operation are features in Rampe "Combine" model barrel finishing machines for deburring, micro-finishing and similar processes. The heavy-duty, integrated machines eliminate hand-separating of parts and media, providing increased machine output.

Other advantages include savings in over-all equipment cost, reduced floor space, less waste and spoilage, and simplified operation.

"Combine" Models are available in standard Rampe machines from 4 to 20.7 cu ft barrel capacity, with selection of one to four compartments. Speed is variable 10 to 36 rpm, with screen traverse movement adjustable from 0 to 1½". The separating screen operates at 350 reciprocations per minute and has removable screens in standard mesh sizes.

Rampe Manufacturing Co., 14915 Woodworth Avenue, Cleveland 10, Ohio.

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GRAYMILLS *Superflo*
COOLANT PUMPS

Thousands of GRAYMILLS Centrifugal Superflo Pumps have been installed as original equipment; and thousands more are in use as conversion or replacement units. In addition to continuous use for pumping coolants, they've been used to pump abrasive slurries, ground glass, lens polishing rouge, enamels, lacquers and degreasing solvents. Over millions of hours of operation, the name GRAYMILLS has become synonymous with pumping performance. Available in 36 standard models completely interchangeable with other makes. Don't replace trouble with trouble . . . put a GRAYMILLS Coolant Pump on your machine and *relax!* They're sold by leading industrial distributors everywhere. Write for complete catalog—No. 56R

GRAY-MILLS
GRAYMILLS CORPORATION
3727 N. LINCOLN AVE. • CHICAGO 13, ILLINOIS
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DESIGNED AND PRICED FOR MACHINE BUILDERS USE

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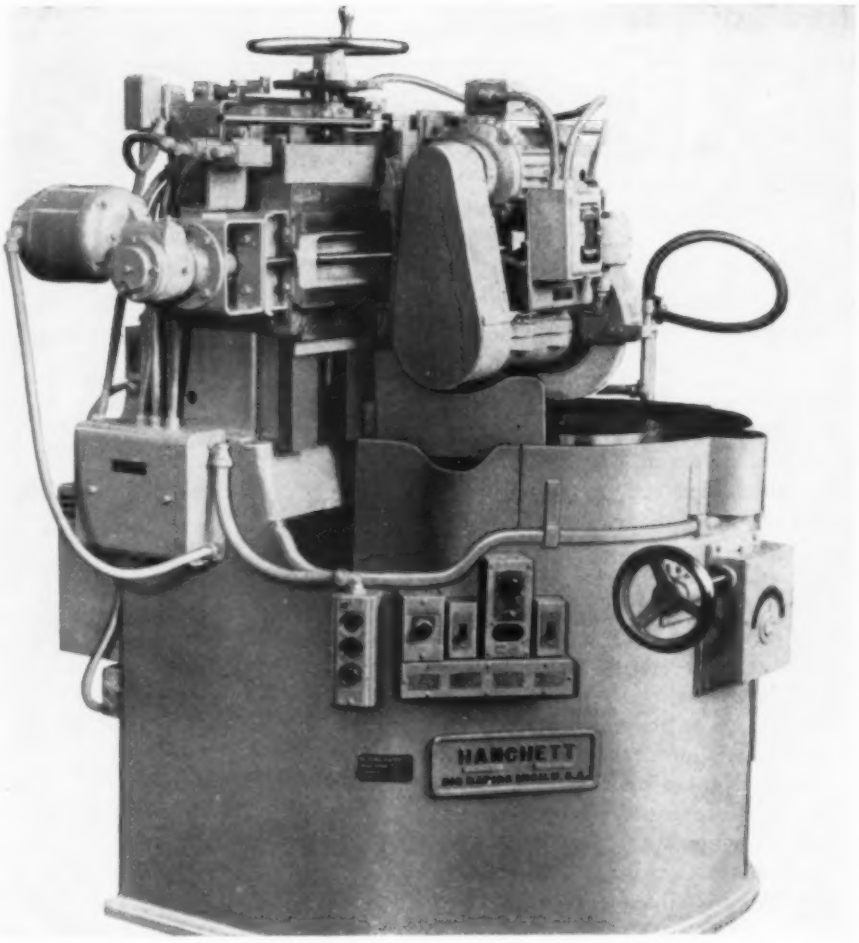

Quality

diamond
wheels
by

THE PAUL L. KUZMICK CO.
271-279 GROVE AVE.
VERONA, N. J.

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SLITTER KNIFE GRINDER PROVIDES PERFECT EDGES

To augment the present line of SK-24 slitter knife grinders, Hanchett has developed a new machine for the user of such knives who requires extra high production while maintaining accuracy and perfect edge finish.

Known as the SK-24 High Power, this new grinder utilizes a 12" wheel mounted on a precision Pope spindle. The motor is fully balanced, 3 hp, and all supporting members are made heavier to give adequate support to the larger grinding head assembly.

Down feed, cross feed and oscillation of the grinding head are each equipped with motor drive, and controls are fully automatic.

Hanchett Manufacturing Company, Big Rapids, Michigan.

Use postpaid card. Circle No. 60

SYNTHETIC COOLANT

A fluorescent green aqueous compound is now available for grinding and honing ferrous alloys. When replacing conventional oil coolants, it will generally alleviate process

The "Other Side" of CLOVER ABRASIVES

The most important side of coated abrasives is, naturally, *the cutting surface.*

But *the reverse side* can mean more to the user than the superficial appearance of the grit. It carries data on the bond, the weight of the cloth or paper, and the kind of grain. All of this has a great deal to do with the *performance* of the product.

Moreover, the manufacturer's name is a signature. If it says "Clover" on the back, you can be sure it is the best of its kind. Ask for a new Clover Catalog and get acquainted with our full line of abrasive products—*it is good business!*

Clover Manufacturing Company

Norwalk, Connecticut

Victor 7-4515

Makers of the famous
CLOVER Grinding and Lapping COMPOUNDS

Quality Abrasives Since 1903

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Performance

diamond wheels by

THE PAUL L. KUZMICK CO.
271-279 GROVE AVE.
VERONA, N. J.

Use postpaid card. Circle No. 259

cleaning in washers following the machining operation. The product contains rust inhibitors and will not deposit salts in use dilutions of 50:1.

Baker/Gubbins Co., 1448 Wabash Ave., Detroit 16, Michigan.

Use postpaid card. Circle No. 61

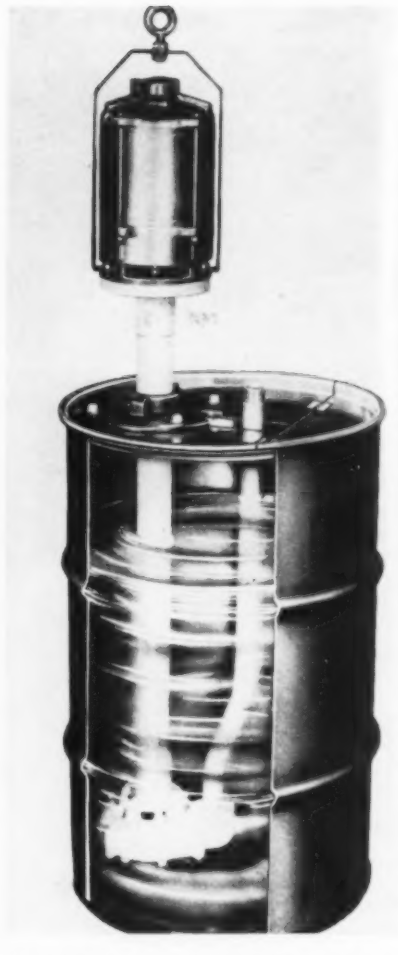
PUMPS MOUNT DIRECTLY ON 30-, 55-GALLON DRUMS

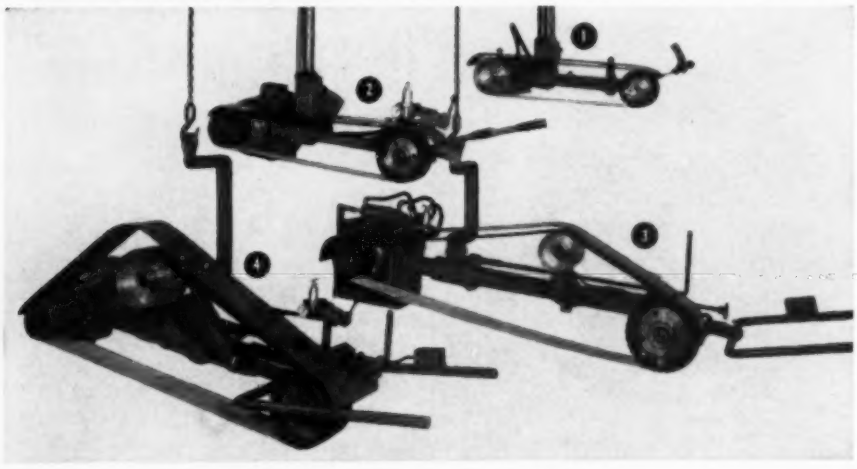
A new series of Graymills Pumps has been designed for circulating, agitating and dispensing moderate and light viscosity cutting oils, coolants, and similar materials.

Adaptable for direct mounting to 30 and 55 gallon drums, the extended column of the Series H55 makes it possible to pump off the bottom of the drum. The shaft is supported by heavy duty motor bearings and an additional guide bushing at the bottom to assure positive alignment and prevent whipping.

Graymills Corp., 3705 North Lincoln Avenue, Chicago 13, Illinois.

Use postpaid card. Circle No. 62





ABRASIVE BELT SWING GRINDERS

Job-Rated to Your Needs

A FULL LINE OF 20 STANDARD MODELS for ALL General and *most* specific production requirements.
1. G & P 6-72 Unit 2. Medium Duty Units
3. Heavy Duty Units 4. Xtra Heavy Duty Units

Available from 2 HP up. Air or Spring Tensioning. Belt sizes 2" thru 6" x 72" thru 132" long.

The *right* combination of size and power will fit YOUR job, whether *Weld Removal, Casting Clean Up or Polishing*. Belt Swings can SAVE you money.

Write for literature.

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INDIANA

Grinding and Polishing Machinery Corp.

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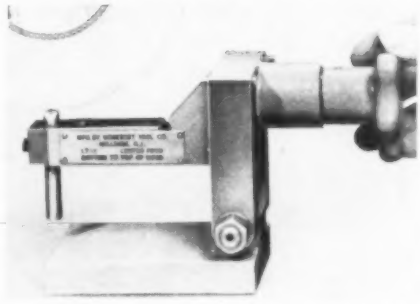
INCREASE SIZE RANGE FOR "MOST ACCURATE" DRESSER



Somerset Tool Company's Model "SS" radius dresser has been redesigned to increase its capacity. It now dresses all abrasive wheels up to and including 14" in diameter, with an accuracy of .0002".

With this dresser, open and easy-to-see operation means that convex, concave, and complex combination shapes are easily and quickly dressed even by inexperienced operators.

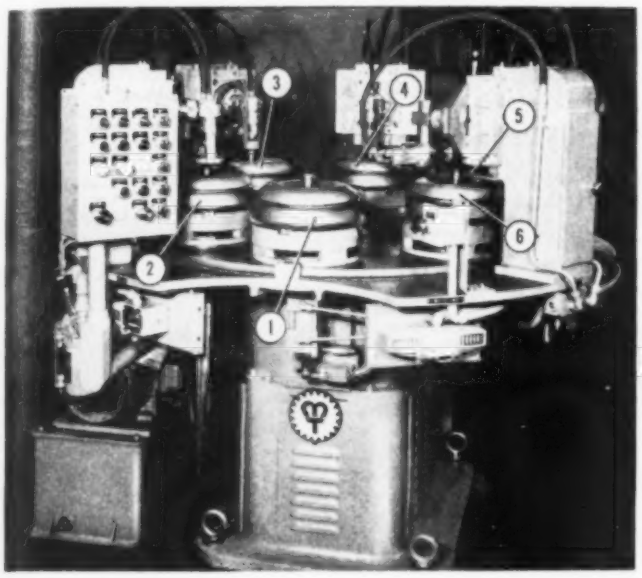
Since the wheel is dressed from below, the wheel guard need not be removed. This increases the safety margin of the dressing operation.

Four stop pins allow complete adjustment from 90° through 180°.

Somerset Tool Company, 220 Virginia Street, Hillside, New Jersey.

Use postpaid card. Circle No. 63

GRINDER USES FOLLOWER PRINCIPLE IN AUTOMATIC DEBURRING, CHAMFERING



Deburring and chamfering contoured parts is often a hand operation—even though it is both inconsistent and time consuming. One automotive manufacturer recently replaced this costly operation with an automatic machine that provides both consistent results and high speed production.

Designed and built by Michigan Tool Co., the Model 483 chamfer grinder utilizes the principle of contour follower grinding. The part it processes is an automatic transmission impeller wheel. In manufacturing, two driving slots are broached in the impeller hub and this leaves a heavy burr on the ID side of one slot and the OD side of the other. In addition, a prior burnishing operation on the hub created a feather edge at the intersection of a 30-degree chamfer.

The Model 483 chamfer grinder is a six-station automatic machine to remove these broaching and burnishing burrs. The six stations perform the following sequences:

Station No. 1—Unload and load (manual)
Station No. 2—Chamfer outer edge of two slots
Station No. 3—Deburr inner slot, left side
Station No. 4—Deburr inner slot, right side
Station No. 5—Remove burnishing burr
Station No. 6—Wire brush outer edge of two slots

Each working station consists of a column with a vertical slide, actuated by a hydraulic cylinder. At stations 2, 3 and 4 the grinding wheels are driven by air motors which are swivel mounted with a variable spring load in either direction to follow the contour and compensate for wheel wear. Station No. 5 is a cup shaped tool driven by a low rpm air motor with a floating drive adapter to provide the correct amount of pressure as well as adjusting for tool wear. Station No. 6 consists of two air motor wire brushes horizontally mounted and spring loaded to maintain correct pressure on the work. Six work holding adapters, each with a clamping collet, hold and locate the workpiece.

Michigan Tool Co., 7171 E. McNichols Road, Detroit, Michigan.

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Now New Concept

in

GRINDING WHEELS

AGRABOND

a combination resilient rubber-bond wheel having the metal removal qualities of a rigid resinoid wheel and the finishing properties of a flexible polishing wheel.

Write for new literature today!

PEKAY ABRASIVES, INC.
271 Grove Ave., Verona, N. J.

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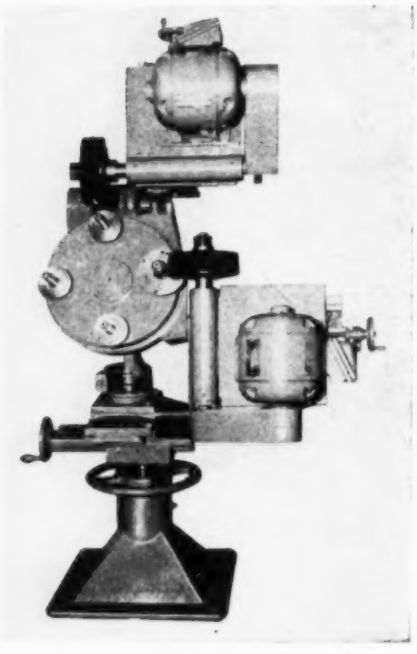
NEW ACME AUTOMATIC POLISHES CIRCULAR PARTS



A new Acme automatic finishing machine for polishing, buffing, or deburring circular shaped parts has been designed to handle parts up to 7" in diameter at a rate of from 235 to 750 parts per hour, depending on finish and production requirements.

The basic machine (illustrated) consists of an Acme four-spindle L-4 automatic index machine with two integral finishing heads. The heads are equipped with wheels to suit the finishing operation. The machine can also be integrated with existing backstand lathes, and can be supplied with or without finishing heads.

Either one, two, or three spindles can be driven to rotate parts. Up to three separate finishing operations can be performed. An unloading cam is provided to permit the use of automatic collet-type chucking arrangements. Optional accessories such as vacuum chucking and tailstock arrangements can be provided.

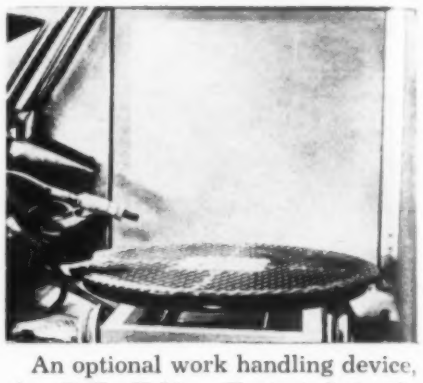
Acme Manufacturing Co., 1400 East Nine Mile Road, Detroit 20, Michigan.

Use postpaid card. Circle No. 65

WEST BLAST UNIT USES STAINLESS IN WORK AREAS

In Pressure Blast's latest wet blast cabinet, Model A-45, those areas in contact with the abrasive slurry are fabricated of stainless steel.

Two double-thickness wide work loading doors provide 30" x 30" access to the interior of the cabinet.



An optional work handling device, the Rollo-Table, illustrated inside the cabinet, facilitates handling large heavy workpieces.

Two blast circuits are provided, an exclusive High Velocity system in Model A-45, and the regular system in Model AA-45.

Pressure Blast Manufacturing Company, Manchester, Connecticut.

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SELL the metalworking market for a full year through HITCHCOCK'S MACHINE AND TOOL DIRECTORY

HITCHCOCK'S MACHINE and TOOL DIRECTORY has been serving the metalworking industry since 1951 and is a primary source for the purchase of metalworking equipment and supplies.

Over 30,000 copies of the Directory are used and reused for a full year by the prime buying influences at the time of selection and purchase. Surveys indicate that 14 people in the typical metalworking plant have access to the Directory. This use factor of 14 people per Directory multiplied by 30,000 copies shows that the Directory has a potential audience of 420,000 users.

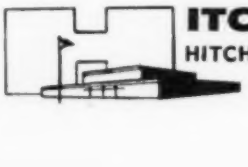
Following are the titles of the men who will receive the 30,000 copies of the Directory.

Executives	5,290
Production Management	8,767
Departmental Management	3,217
Engineering	9,451
Purchasing	1,161
Other Titles	43
Non-Manufacturing Industries	1,103
All Others	1,968

A full page black and white advertisement in the Directory costs $420.00. This means that you can reach each of the 420,000 users for 1/10 of a cent a day. Figured on a 5 day week, there are 250 days in a year that the Directory is used. Your page advertisement costs you only $1.68 per day.

The opportunity to advertise in HITCHCOCK'S MACHINE and TOOL DIRECTORY comes only once a year so make immediate plans and be sure that your sales message is seen at the time the men of the metalworking industry are ready to buy. Advertising in the 1962 edition closes October 16.

Write, wire or call for complete details.



ITCHCOCK PUBLISHING CO.

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GRINDING WHEEL INSTITUTE SPONSORS STATE SAFETY INSPECTOR TRAINING

A new program recently announced by the Grinding Wheel Institute, Cleveland, Ohio, will provide technical assistance to state safety personnel in the field of grinding wheel safety.

The program is already in operation in Florida, through Ralph N. S. Merritt, retired Norton Company executive, former chairman of the Institute's safety committee for five years, and currently secretary of the American Standards Association committee on the grinding wheel Safety Code. Merritt has been meeting with personnel of the Department of Industrial Safety to assist in the setting up and implementation of an effective grinding wheel safety training program in that state. His services have been provided by the Institute.

Similar technical expert service is available to all states, without expense or obligation to the states involved. Virginia has expressed interest. So has Connecticut, which recently became the fourteenth state to adopt the American Standards Association's Safety Code for "The Use, Care, and Protection of Abrasive Wheels" (B7.1-1956) for legal regulation of the use of grinding wheels within the state.

Inquiries should be sent to: Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

ASSOCIATION APPROVES SIZE STANDARD, DIAMOND WHEELS

As a supplement to the standard identification code for diamond grinding wheels approved in 1957, the American Standards Association has reported the approval of a new American Standard specifying the sizes of diamond grinding wheels, hand hones and mounted wheels.

Developed by the Grinding Wheel Institute in cooperation with the Industrial Diamond Association of America, "American Standard Specification for Shapes and Sizes of Diamond Grinding Wheels, Hand Hones and Mounted Wheels, B74.3-1961" establishes a realistic listing of sizes that are based on sound engineering principles and industrial demand. It serves as a companion to "American Standard Identification Code for Diamond Wheel Shapes, B74.1-1957."

Provided in the new standard are 34 tables indicating dimensions of diamonds, hand hones and mounted wheels, and a table of old and new wheel designations. Copies are available at $1.50 each from the American Standards Association, Dept. P 247, 10 East 40th Street, New York 16, N.Y., or the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

DIE ASSOCIATION HONORS RETIRING EXECUTIVE

The trustees of the National Tool, Die & Precision Machining Assn. paid tribute to George S. Eaton upon his retirement as executive vice president and executive secretary after 16½ years in the service of the association, at a recent meeting in Milwaukee.

Charles R. Bender, who has been serving as assistant executive secretary of the association since 1953, has been appointed executive secretary. A former tool designer himself, Bender joined the NTDPMA staff after having served as managing director of chambers of commerce in Ohio and Indiana.

Among the guest speakers to pay tribute to Eaton, were Richard F. Moore, president of Moore Special Tool Company, Bridgeport, Conn., the association's only two-term president, 1944-45 and 1945-46, and Jack Kleinoder, vice president and general manager of Volkert Stampings, Inc., Queens Village, L.I., N.Y., and president of the NTDPMA in 1958-59.

Ten past presidents of the National Tool, Die & Precision Machining Assn. gather around "Mr. Tool and Diemaking," George S. Eaton, who after 16-1/2 years is retiring as executive vice president and executive secretary of NTDPMA. Left to right: Herbert C. Murrer, president of Murrer Tool Company, Inc., Cincinnati, Ohio; Willis G. Ehrhardt, president of Ehrhardt Tool and Machine Company, St. Louis, Mo.; Herbert Harig, president of Harig Manufacturing Corp., Chicago, Ill.; Jack Kleinoder, general manager of Volkert Stampings, Inc., Queens Village, L.I., N.Y.; Joseph N. Huser, president of B & H Tool and Machine Corp., Indianapolis, Ind.; Centre W. Holmberg, president of August W. Holmberg & Company, Inc., New York, N.Y.; George S. Eaton; Harold G. Murdock, vice president of Arrowsmith Tool & Die Corp., Los Angeles, Calif.; Philip R. Marsilius, executive vice president of The Producto Machine Company, Bridgeport, Conn.; Richard F. Moore, president of Moore Special Tool Company, Inc., Bridgeport, Conn.; Jerome H. Stanek, president of Stanek Tool & Mfg. Company, Milwaukee, Wis.

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LOW COST WAY TO
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When you dress grinding wheels regularly you clean loaded pores, uncover fresh abrasive grains — GET NEW PERFORMANCE AGAIN AND AGAIN. Dressing makes every wheel more efficient. In the complete Desmond line there is a dresser to meet your requirement—at low cost. A typical Desmond-Huntington dresser* costs less than $3.00: replaceable cutter sets average 36c. Ask your Desmond distributor's advice.

The only complete line of grinding wheel dressers and cutters

Desmond

Desmond-Stephan Mfg. Co.
Urbana, Ohio

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INDUSTRY NEWS continued

BAY STATE TO BUILD PLANT IN LUXEMBOURG

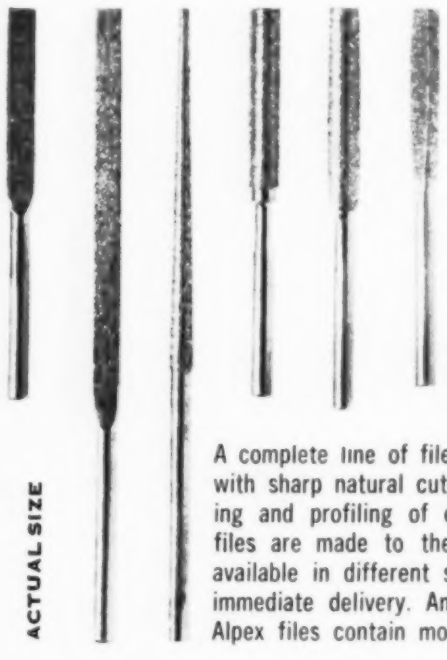
Bay State Abrasive Products Co., Westboro, Massachusetts, has selected the Duchy of Luxembourg as the site of their third manufacturing subsidiary. The other two are located in Brantford, Ontario, Canada, and Torrance, California (Felker Mfg. Co.).

According to Arthur E. Gilman, president, who just returned from Europe after completing preliminary negotiations with the Luxembourg government representatives, excavation for the new subsidiary in the Commune of Steinsel, Luxembourg, will start in October. It is anticipated that actual grinding wheel production will commence during the summer of 1962. The basic lines will include vitrified, resinoid, reinforced resinoid and diamond abrasive products.

These products play an ever increasing and important role in the huge metal producing and metal working industries. In Western Europe, the steel industry has expanded 107% in the past 10 years vs. the United States' gain of 2% for the same period. General metal working has also shown a marked gain. Whether for defense or peace, Bay State's new Luxembourg plant will assist Western Europe measurably in her continued future growth.

Although the Westboro, Massachusetts plant has for many years exported grinding wheels to the European market, it is expected that sales volume will rise sharply within the next few years as a result of the new Luxembourg project. It is not intended to import European manufactured products into the United States, according to Gilman.

The inner six countries currently in the Common Market to be served by Bay State's new European plant include Belgium, Netherlands, Luxembourg, West Germany, Italy and France.



ACTUAL SIZE

MORE DIAMOND PER DOLLAR

A complete line of files made from selected quality diamonds with sharp natural cutting edges exposed. For use in machining and profiling of carbide and ultra-hard materials. Alpex files are made to the standards of American industry, are available in different shapes and sizes, and are in stock for immediate delivery. An examination and trial will prove that Alpex files contain more working diamond surface per dollar.

FLAT • LONG FLAT • TAPER ROUND • ROUND • OVAL • TRIANGULAR

MADE IN U.S.A.

ALPEX DIAMOND FILES • ALPEX DIAMOND WHEELS

ALPEX WHEEL COMPANY
TEANECK, NEW JERSEY

Use postpaid card. Circle No. 265

TIMESAVERS COMPLETE PLANT EXPANSION

Completion of Timesavers Sanders, Inc.'s new plant addition was announced by Gordon L. Schuster, President. Site of the plant is 5270 Hanson Court, Minneapolis 22, Minnesota.

The new addition is a single story 90' x 100' concrete-block building that will serve as assembly, research and demonstration facilities for the company, which is a pioneer and leader in the manufacture of wide abrasive belt sanding machinery.

Schuster pointed out that these facilities were need to keep abreast of the company's growth, indicating a backlog of orders for the current period as being in excess of a quarter-million dollars. The present plant facilities will be utilized for expanded machine shop operations, parts and storage.

KERNS UNITED OPENS NEW EXECUTIVE, SALES OFFICES

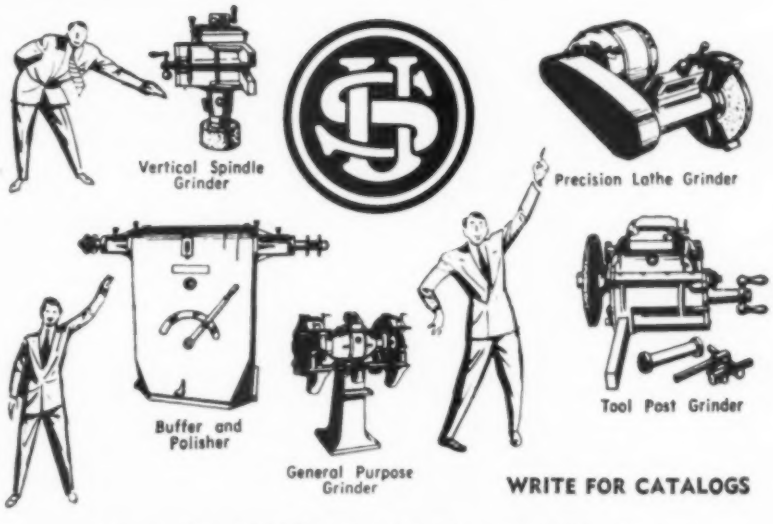
Kerns United Corporation, manufacturer of specialized industrial lubricants, has moved into a new executive, sales, and general office facility in Calumet City, Illinois.

Calumet City was chosen for the site because it is well situated to serve the metalworking industry.

GRINDERS

BUFFERS

Now when quality performance and money-saving are of utmost importance—when cost-minded executives demand exacting vigilance, these tools fulfill every requirement.



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Over 60 YEARS of Service to Industry

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

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Anything new in Diamond Wheels?

DIAMOND MANDRELS for precision grinding

You can grind small diameter holes in hardened, heat sensitive steels, carbide, ceramic, ferro-ceramic material, and glass. Shanks are hardened and ground accurately. Diamonds are mounted under controlled atmospheric conditions by a patented new electronic method, assuring their maximum retention. The sharpest edges of the diamonds protrude for rapid stock removal. Widely used on jig and internal precision grinding. Available in a complete range of sizes from .018 inch to .750 inch in diameter.

CUT GRINDING TIME

SEND US SATISFACTION GUARANTEED ORDERS. MAKE US PROVE THESE FACTS!

PRECISION DIAMOND TOOL CO.
P.S.M.
BOX 274C
ELGIN, ILLINOIS

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GRINDING and FINISHING is regularly distributed to qualified users of abrasives at their company addresses.

The magazine is also available on subscription to anyone interested, user or not, as explained below. (Supplier member of the American Society for Abrasives may subscribe at a special rate of $4.50 per year.)

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Number of Employees _____

Nature of Operation:
☐ Toolroom grinding
☐ Precision grinding
☐ Finishing operation
☐ Rough grinding
☐ Coated abrasive operation
☐ Abrasive grain operation
☐ Buffing and polishing

FILTERS FIRM COMPLETES OFFICE CONSOLIDATION

Commercial Filters Corporation has completed the consolidation at its Melrose, Massachusetts, executive offices of all administrative functions pertaining to the Fulflo, Honan-Crane, Delpark and Michiana filter lines.

The consolidation has involved the relocation of only administrative, sales and engineering personnel from the company's Lebanon, Indiana plants. They formerly were operated under the name of Indiana Commercial Filters Corporation. No plans, however, have been advanced for moving the manufacturing facilities located in Indiana, and shipments of Honan-Crane, Delpark and Michiana equipment will continue from the Indiana plants.

CONNECTICUT ADOPTS ASA WHEEL SAFETY CODE

Connecticut recently became the fourteenth state to adopt the ASA abrasive wheel safety code (B7.1-1956) as a legal code governing the use of grinding wheels. The adoption became official August 15, 1961, following a ruling from the office of the State Commissioner of Labor.

AROUND THE INDUSTRY . . .

Appointments of W. E. Shipley Machinery Company of Philadelphia as their authorized distributor for the Philadelphia and Baltimore areas is announced by George M. Lamb, Sales Manager of Moore Special Tool Company, Bridgeport, Connecticut. Moore is a leading producer of jig borers, jig grinders, and measuring machines used extensively for highly precise locations in space and computer instrumentation as well as tool room work.

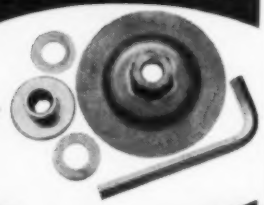
Gisholt Machine Co., Madison, Wis., has announced the appointment of Syracuse Supply Co. as its representatives in the Buffalo, N.Y., area. Gisholt also appointed Brown & Zortman Machinery Co., Pittsburgh, Pa., as its representative in that area.

Similar Gisholt appointments include Darling-Crose Machine Company, Inc., in San Francisco, Calif.; Baldwin Supply Company, Charleston, W. Va., for portions of West Virginia and Ohio; and Cinrock Machinery, Inc., Clifton, New Jersey.

SAFETY BACKS

STRAIGHT AND FLARED CUPS

SAFETY FIRST



LOW COST ADAPTOR KIT

The new low cost Carroll Adaptor Kit made of cold forged steel offers outstanding features not found in other designs costing several times more. Strong — Wear Resistant — Rust Resistant — High Quality.

Also designers of:
• Carroll Safety Backs • Throw-A-Way Hubs • Track Grinding Wheel Safety Backs • Heavy Duty Disc Wheel Inserts

Write for further information

CARROLL
PRESSED METAL, INC.
PM INC 133 DEWEY ST. WORCESTER 10, MASS.

SPECIALISTS IN ALL TYPES OF GRINDING WHEEL METAL INSERTS

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DIAMONDS RESET

For a very small charge, you can safeguard your investment in Diamond Dressers and lengthen the useful life of the tool immeasurably, by having us reset the diamonds periodically.

FOR FAST SERVICE SEND THEM TO
ARTHUR A. CRAFTS CO., INC.
603 Newbury St., Boston
9440 W. Ainslee, Schiller Park, Ill.
Use postpaid card. Circle No. 272

DISTRIBUTORS WANTED
Abrasive Precision & Production BLASTING Machines, Cabinets, Grain & Supplies—Complete, natly. advertised line. A few choice territories now available. Only qualified industrial supply firms reply, indicating areas presently covered, products handled, sales force and details.
Reply Box 48 c/o Grinding and Finishing Wheaton, Illinois

CHANGING FACES . . .

The Abrasives Division of the Elgin National Watch Company has announced the transfer of Forrie Svendsen from the New York State area to the Indiana territory.

The Taft-Pierce Manufacturing Company of Woonsocket, R.I., has announced the appointment of Richard V. Freeman as assistant manager of Machine Tool Sales.

James Davis is now sales engineer for the Rotor Tool Co., Cleveland, Ohio.

The Precision Grinding Wheel Company, Inc., Philadelphia, Pa., has announced the following appointments to its sales organization: A. J. Sunderland, sales representative in the Indiana territory; R. L. Lang, Chicago area sales representative; and D. F. Livingston, New England area.

Dal Miller Co., South Gate, Calif., has been named as a sales agent for the Pneumatic Tool Division of Thomas C. Wilson, Inc., Long Island City, N.Y.

John R. Strom

John R. Strom, technical director of the Roto-Finish Company, Kalamazoo, Michigan, and the Ransohoff Company, Hamilton, has been promoted to vice president. He was made technical director in 1960.

A second appointment in the two companies was that of Richard D. Taylor as marketing manager.

The appointment of Dewitt G. Mitchell as sales manager of the Knife Division of the Simonds Worden White Company, Dayton, Ohio, was recently announced by F. L. Meacham, president.

Earl R. Carpenter has been assigned as a field service engineer in the Los Angeles area for Gisholt Machine Company, Madison, Wis.

Robert P. Jones, New England division manager of Oakite Products, Inc., since 1954, has been assigned to the firm's New York office, to do staff work. He will report directly to the president, John A. Carter. Roger R. Heroux, formerly a representative in Springfield, Mass., succeeds him.

Robert F. Morgan, of Royal Oak, Michigan, has joined the Detroit sales staff of Pangborn Corporation, Hagerstown, Maryland.

Eugene L. Jackson now heads marketing operations for the automotive and industrial divisions of Aro Equipment Corporation, Bryan, Ohio.

Gisholt Machine Co. (Great Britain) Ltd., Surrey England, has appointed S. W. Perkins to its board of directors.

continued

New crushing techniques for diamond lapping compounds give greater resistance to breakdown and maximum cutting efficiency. Developed by West Coast Diamond Tool Co., *these compounds guarantee you perfect satisfaction backed by the* ***integrity*** *of 3 generations in industrial diamond skill.*

the Finest
DIAMOND
LAPPING COMPOUND
NOW IN
SYRINGE
APPLICATORS
for Waste-free, Pinpoint Application

Compounds are available in mesh and micron sizes for lapping down to a one-half microinch finish . . . and come in disposable, non-breakable plastic, Syringe Applicators (at no additional charge). Try West Coast on your next order! You'll save money and turn out a better job! *Write for Price List and "Facts You Should Know About Diamond Compound"*

WEST COAST
DIAMOND TOOL CO.
403 NO. FOOTHILL RD.,
BEVERLY HILLS, CALIF.

"most reliable & complete source of industrial diamond tools"

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M-B PNEUMATIC GRINDERS

Model M-CR-B

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Model HD-CR

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INDUSTRY NEWS continued

Laurens C. Seelye is the new manager, sales engineering department, Bay State Abrasive Products Co., Westboro, Mass. He has been with Bay State for ten years, and was with Norton Co. for 16 years.

Allan W. Barnes has been named service engineer for the newly-formed Rotor Tool Company of Canada, Ltd.

Leslie M. Nelson has been named manager of Sales Engineering for the Cleveland Instrument Co., Cleveland, Ohio.

The Cutting Tool Division of Brown & Sharpe Mfg. Co., Providence, R.I., has announced these four new appointments: Edward Kibbit, supervisor of subsidiary operations; Henry A. Szostek, district manager, Eastern Sales District; Frank E. Montie, factory manager, Greystone Plant; T. Russell Hall, plant superintendent.

John G. Kelso has been promoted to manager, Norton Casale S. A. Mendoza, Argentina. This is a recently completed plant for the manufacture of silicon carbide abrasive.

Charles R. Stelljes has been named manager of engineering and research for the Portable Tool Division of the Porter-Cable Machine Co.

Esso Standard Region, Humble Oil & Refining Company, has named Frank M. Summers as manager of national, commercial, and lubricant sales, a new position.

Edward J. Finn., Jr., formerly superintendent, Central Shops & Utilities of Carborundum's Bonded Abrasives Division, has been promoted to manager of that Division's Engineering Design Department. Robert W. Lear has accepted the position of vice president in charge of marketing for the company. J. Raymond Berg, has been appointed purchasing agent for Carborundum's Coated Abrasives Division.

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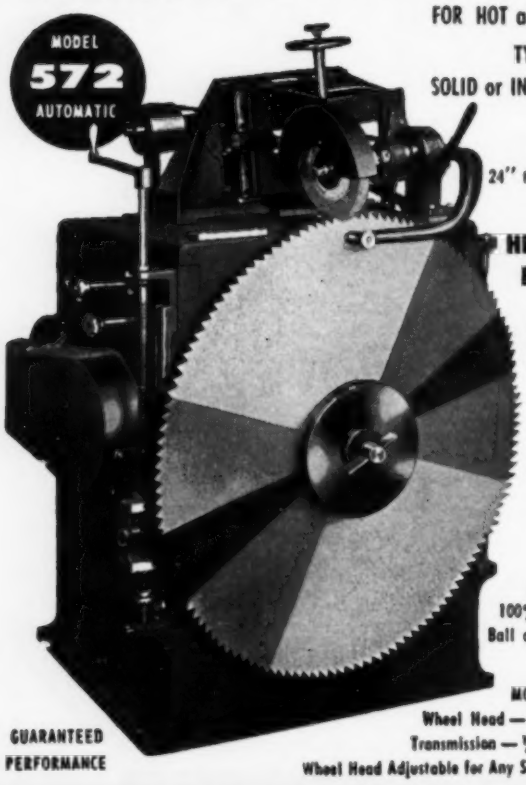

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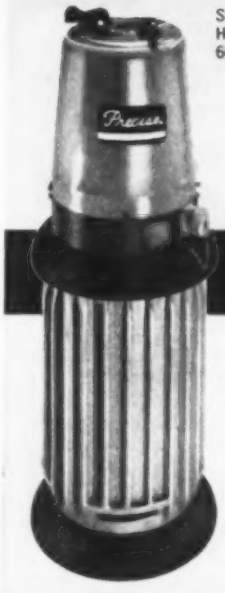

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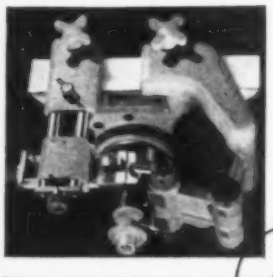

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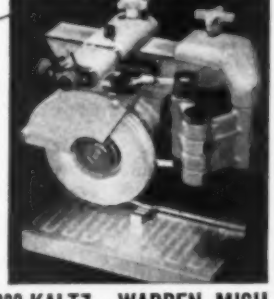

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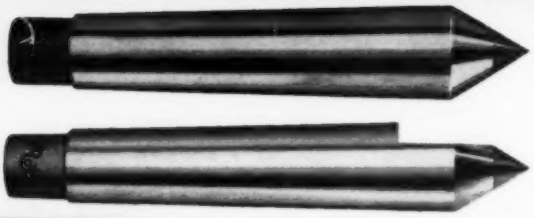

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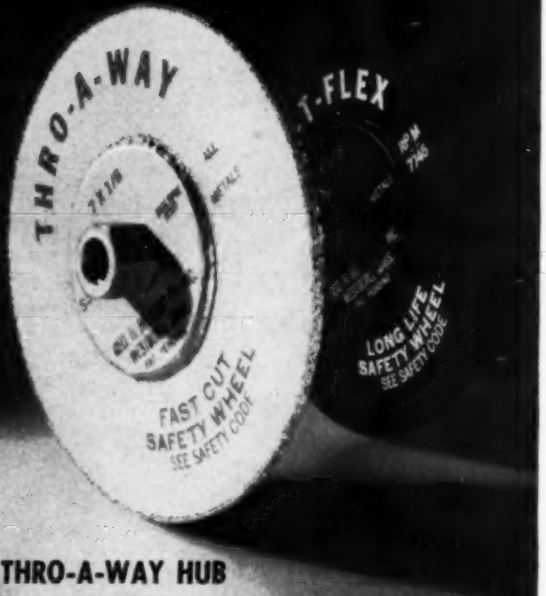

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Grinding and Finishing

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Abrasive Operations on the '62's

In this extensive round-up, the importance of abrasive machining in the automotive industry will be shown in a photo story covering all major makes of 1962 cars. Since many of these processes and techniques are applicable in other industries as well, this coverage of America's largest single industry is an indication of the value of abrasive operations in American industry as a whole.

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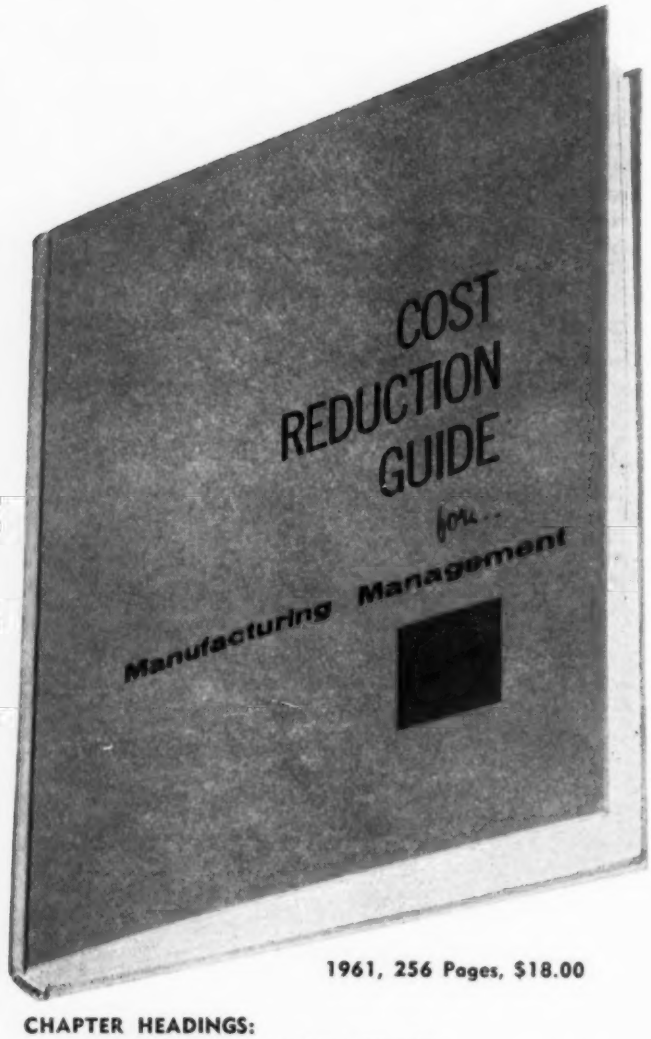

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This Is Responsibility?? And Leadership??

As this is written, a crankshaft grinder at the Bendix Westinghouse Automotive Air Brake Company plant in Elyria, Ohio is in trouble with his union . . . (yes, you guessed it, the United Auto Workers). It seems that this 42 year old father of eight children is doing more each work day than Reuther's henchmen (they are called labor "leaders") say he should. Walter Lucki (that's his name) was told to do no more than 322 bearings on his shift but he grinds 435 or 35% more. Because he exceeds his quota, Walter's employer pays him about $30 more per week. And when there are ten mouths to feed in the house, anything extra in the weekly paycheck can be most welcome.

Before some sensitive reader brings up the hazards to life and limb to "overworked" workers, it should be noted that apparently the increased output does not place an extra burden on Lucki as most of his fellow workers were also able to produce up to 135% of their job quotas until August 26. Then some "brilliant" union strategist got the idea that Bendix-Westinghouse shouldn't get more than 322 bearings per man or what is termed by the UAW as "normal standard" or 100% of an arbitrary quota.

As one would expect, the company has filed a petition for an inquiry by the National Labor Relations Board into an unfair labor practice. To us, this is not just a dispute between management in a plant in Elyria and a union headquartered in Detroit. It goes much deeper and the effects of this and too many other similar cases in plants from coast to coast reaches into every American home and pocketbook. In fact, the principle involved could well become the difference between the survival of our way of life or the alternative of having our grandchildren grow up in a slave state.

With a real crisis in Berlin, our difficulties with Cuba, the troubles in Africa, Laos and elsewhere, our efforts to "catch up" to Russia in the space race . . . it would seem that every American owes it to his country, his family and to himself to do the best job possible . . . whether in direct defense work or other pursuits. Our counterparts in other countries of the world are doing it, not only in Russia but in the free world as well. This is evident to anyone who has visited Europe and the Far East in recent years. Higher production and material cost in this country are permitting our own allies in the free world to grab our markets. The result will be less demand for our goods, fewer jobs and yes, less dues for the union treasuries.

This country became great because our parents and those before them had the courage, ambition and drive of the Walter Luckis who fortunately still are found in the ranks of labor, farming and management. We can no longer afford the luxury of a "normal standard" in any area of American life. It will take "super-normal standards" on the part of all (especially labor leaders) to have the U.S.A. stay in the ball game.

Vincent C. Hogan

Publisher

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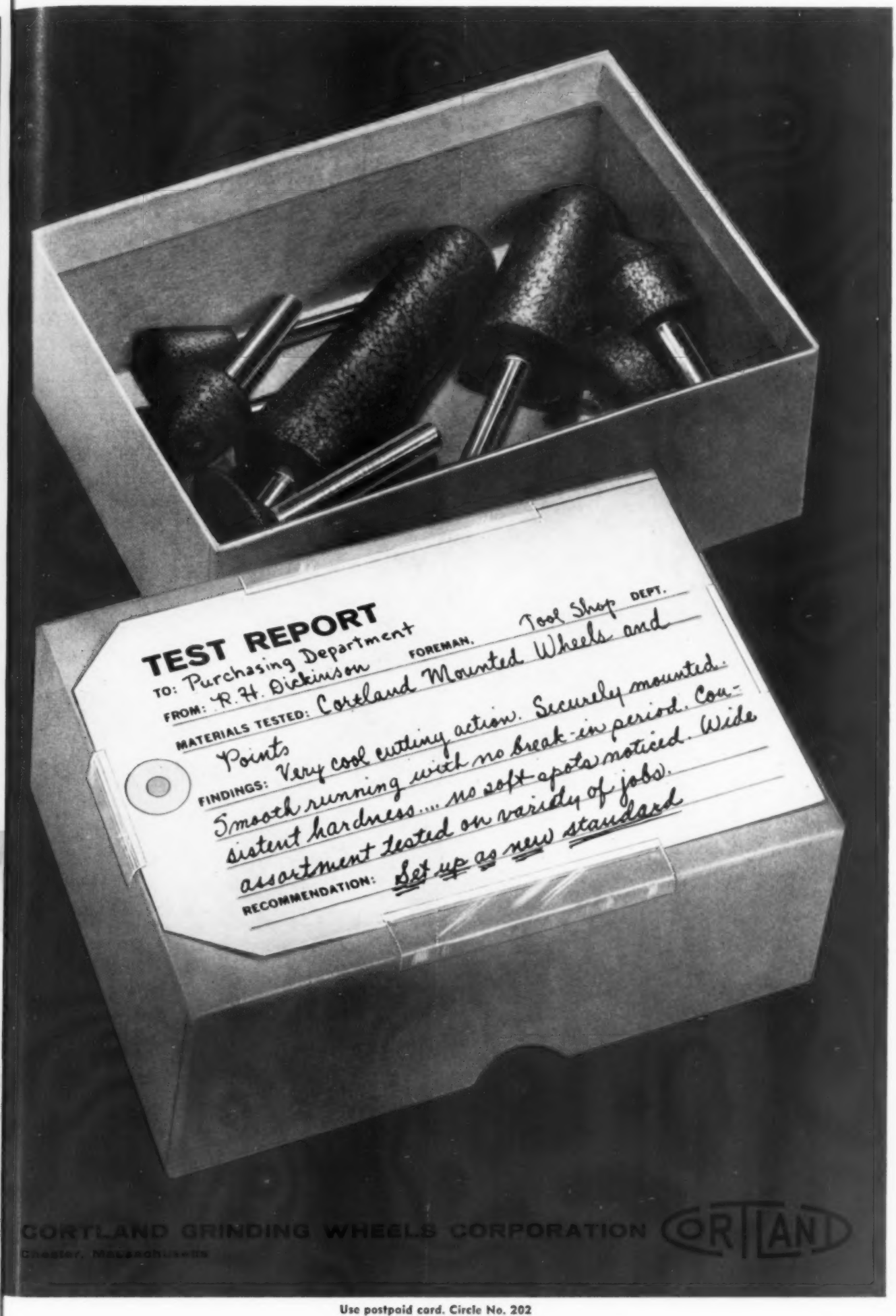
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